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The attention of learned societies and other institutions which exchange scientific publications with the University of Kansas is called to the list of publications of this University on the third and fourth pages of the cover of this issue.

Those marked "Supply exhausted" cannot be furnished at all; those marked "Supply small" cannot be furnished separately; those marked "Supply large" will gladly be furnished to any of our exchanges who may need them to complete their files.

Back numbers of the *Kansas University Quarterly* and *Geological Survey,* as far as possible, will be sent to those of our newer correspondents who are able and willing to reciprocate.

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THE
KANSAS UNIVERSITY SCIENCE BULLETIN

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(Whole Series, Vol. XXII, No. 1.)

ENTOMOLOGY NUMBER IV

CONTENTS:

THE CICADELLIDÆ OF KANSAS.
P. B. Lawson.

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THE KANSAS UNIVERSITY SCIENCE BULLETIN

VOL. XII, NO. 1.] MARCH 15, 1920. [WHOLE SERIES VOL. XXII, NO. 1

The Cicadellidæ of Kansas.*

BY P. B. LAWSON.

INTRODUCTION.

The first attempt to make a list of the *Cicadellidæ* of Kansas seems to have been made by Professor E. A. Popenoe, who in 1885, in the Transactions of the Kansas Academy of Science, vol. IX, p. 63, listed a few of the members of this family that he had personally collected in the two preceding years. Nothing more seems to have been done along this line till the year 1905, when there appeared a list of the Kansas species in the Transactions of the Kansas Academy of Science, vol. XIX, p. 235, by Mr. F. F. Crevecœur, in which some eighty species and varieties were reported, nearly if not all of them taken by himself, within a few miles of his home at Onaga, Kan. He was followed by Mr. E. S. Tucker, who in 1906, in vol. XX, part 2, p. 192, of the same publication, added twenty-three species to Mr. Crevecœur's list, all of these species being taken in Douglas county. A fourth list was published in 1907 by the same writer in the Kansas University *Science Bulletin*, vol. IV, p. 65, where were listed the species taken by him in Douglas and Sedgwick counties. And finally, in 1911, there appeared a complete list of all the *Cicadellidæ* taken in the state to date, by Mr. S. E. Crumb, who published his list, along with available host plant records, in the Transactions of the Kansas Academy of Science, vol. XXIV, p. 232.

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* Submitted to the Department of Entomology and to the graduate faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Received for publication December 12, 1919.

It would seem that with five lists already published of the Cicadellid fauna of the state, that some other group might well have been chosen for further work. State lists, such as the ones referred to, are of great value to systematic entomologists in determining the geographical distribution and limits of the species enumerated, but to the beginner, who starts out to get acquainted with the fauna of a given region, they cannot be of much help, other than to inform him that he might or ought to run across the species so listed. Accordingly we have thought that a systematic treatise of the known Kansas forms might not be out of place.

It has been our aim to make this paper something more than a state list. The attempt has been made to provide, rather, a sort of manual for the study of our native forms. Accordingly keys have been provided for the separation of all the groups down to species, descriptions have been written for all the species known to occur in the state, and, as far as possible, host plant and locality records have been added to assist in the finding of any desired species.

We have, moreover, attempted to bring together our latest knowledge concerning the economic importance of this family. Many articles have been written on this subject, but each treats only of some particular phase of it. It has been thought that a summing up of our knowledge on this subject might help to a correct appreciation of the economic position of this group.

The systematic position of this and of related families is of interest to the systematist. We have not tried to advance any essentially new ideas on the subject, but have thought it advisable to give what seem to be the prevailing ideas on this line.

No attempt has been made to give a detailed description of the morphology of the *Cicadellidæ.* We have included only a brief chapter on this phase, just enough to enable one to properly use the keys and understand the descriptions. But we have gone rather fully into a study of what we have called the "internal male genitalia." This is what may properly be considered the original part of this paper, and therefore we have devoted a whole chapter to its discussion.

It should be said here that the list of species is by no means complete. We know of some species, previously listed as occurring in the state, which are here omitted. This has been done because of what seem to have been doubtful determinations. We have endeavored to exclude every species of the occurrence of which in the state we had any doubt. Accordingly we have practically confined ourselves to the species represented in the Snow collection at the University of Kansas. There are other collections in the state which will yield additional records. It is our purpose to examine these as soon as possible and add to this list. Among others, the collection of the Kansas State Agricultural College and Crevecœur's collection will yield further records, as will the private collections of Prof. Herbert Osborn and others who have collected in the state. These all should have been included in this paper, but a combination of circumstances seems to have made it impossible.

We have, however, included in the keys, and given descriptions of a goodly number of species, which, judging from their known occurrence, are likely to be found in the state. We believe this will add to the usefulness of the paper.

The question of bibliographies has proved to be a troublesome one. It was finally decided to give a rather full bibliography for each species, but to omit, except in cases where the bibliography was brief, the mere lists and those papers which do not distinctly add to our knowledge of the group. Accordingly we have chosen our bibliographies with a view to showing the course of the synonomy of the species, and to those papers which give information as to life history, food plants, economic importance and control, and those which give figures illustrating the species. In addition we have tried to include a list of the papers which have appeared since the publication of Van Duzee's catalogue.

ACKNOWLEDGMENTS.

This paper was started and completed under the direction of Prof. S. J. Hunter, head of the department of entomology in Kansas State University. To him the writer is greatly indebted for making this work possible and for his ever readiness to help with suggestion or with needed equipment or material. Dr. H. B. Hungerford, of the same department, has also been keenly sympathetic and helpful during the carrying on of the work.

Prof. Herbert Osborn kindly determined much material for me, as did Dr. E. D. Ball. I am especially indebted to the latter for much help received from him during a period of six weeks spent at Ames. During that time he gave me many helpful suggestions out of his large acquaintance with this group, and turned over his whole collection and library, as well as the collections of the Iowa State Agricultural College, for my use and study. I was thus enabled to examine many of the Osborn and Ball types, Doctor Ball's individual types, and as many of Van Duzee's types as are in the college collection. It would be hard to conceive of any one being more free and ready to help with the results of their years of labor and study.

Needless to say, many papers on the *Cicadellidæ* have been freely used. The bibliography given would have been impossible without Van Duzee's wonderful catalogue, with the exception here and there of a few papers on the economic phase, and of the papers which have appeared since the catalogue was issued. Besides the catalogue, we have used freely the papers written jointly by Osborn and Ball, as well as the individual papers of each. Van Duzee's writings on the family have been very helpful, as have De Long's paper on the Tennessee species and on the genus *Chlorotettix*.

The writer was fortunate to start his study of this group with a very large collection already gathered together from all over the state. Credit should be given to several of those whose locality records are here being used. Prof. F. H. Snow's name appears on many of the specimens collected in Kansas. The records of Pottawatomie county are practically all those of Mr. F. F. Crevecœur. Mr. E. S. Tucker took many species from

Sedgwick and Douglas counties. Mr. S. E. Crumb made large collections from Douglas and Cherokee counties. Mr. F. X. Williams should have credit for the specimens taken in most of the extreme western and northwestern counties. Mr. R. H. Beamer collected many species, especially in the southeastern counties. Dr. C. P. Alexander also collected several species, chiefly in Reno and Hodgeman counties. The records from Riley county, as well as several others, were sent me by Dr. M. C. Tanquary, of the Kansas State Agricultural College. Unfortunately this list was not received in time to be fully incorporated in this paper.

Thanks are also due to Miss Gertrude Standing for her great help in typewriting this paper. To these, and to all who in any way assisted with the work, the writer is greatly indebted.

Economic Importance of the Cicadellidæ.

The relation of the *Cicadellidæ* to problems of economic importance has received a very varying degree of attention from entomologists. The Homopterists, and especially those who have studied this particular family, have always been more or less forward in calling attention to their destructiveness. On the other hand, many entomologists have had their attention so taken up with insects whose damage has been so much more evident that they have regarded the *Cicadellidæ* as having very little bearing or relation to real economic entomology. But it is not our purpose to say that the one group has been too enthusiastic, and the other too reticent, in recognizing the true economic position of these forms. It is our purpose merely to discuss the problem in the light of our present-day knowledge, and let the reader decide which group is right, or whether each is but partly right.

The damage done by the *Cicadellidæ* is that of puncturing the tissue of the leaf or stem of a plant, and then with its efficient little mouth parts sucking up the plant juices. Because of this means of feeding, the damage is seldom seen, certainly not by the casual or superficial observer. The work of insects with biting mouth parts, on the contrary, is readily seen, for the host plant soon is distorted or destroyed by the biting out of portions of the leaves or stems. Thus the work of grasshoppers, beetles, etc., is soon manifest, even though they be present in relatively small numbers. The results of the feeding of a large number of *Cicadellidæ* on a plant may not be noticed, however, till the plant is beyond rescue, for it will retain its form until pumped dry and the leaves begin to curl up and fall.

There are other reasons, too, why these insects escape notice so often, even though doing damage. In the first place, they are very small, not small as all insects go, but small as compared with the insects which the ordinary person usually observes, and in comparison with many of our main economic pests. They vary considerably in size, many being under 3 mm. in length, while others, especially South American species, may reach 18 or 20 mm. in length. Our largest forms are about 14 mm. in length, or slightly over half an inch, while our smallest forms are close to one-twelfth of an inch long. The majority or our species run from three to seven millimeters in length, or from about one-eighth to one-fourth of an inch.

Their small size, coupled with the fact that they usually remain on the under side of the leaf or blade of grass, accounts very readily for their so easily escaping detection. Then, too, as a rule, they are protectively colored, that is, they usually greatly resemble their surroundings in color. Thus a green species on a green blade of grass may not be seen even though in full view, and when one is looking straight at it. In some species also the art of camouflaging seems to have reached perfection. Though the general colors may not correspond very well with those of the host plant, yet there is a stripe here or a spot there which seem to be present solely for the purpose of making the insect invisible, at least such is their effect. Some species also, such as *Dorycephalus,* show clearly an adaptation of form, as well as color, to their environment. Sitting on a head of *Elymus,* they so greatly resemble their surroundings as to be practically invisible, and according to Professor Osborn a head of the host may be carefully examined and reveal no insect until it is shaken loose.

Frequently, too, the damage done by this group of insects is attributed to other insects or to the attacks of fungi. Usually the result of the continued sucking of the life juices of the plant results in more or less discoloration of the plant cells around the puncture. These spots often resemble the spots produced by other insects and may often be mistaken for the presence of some fungous disease. Professor Osborn points out the fact that the work of species infesting grasses and grains may be readily confused with the work of aphids or thrips, but that usually the aphids do not discolor nor produce spots on the infested plant, at least during the early stages, while the injury of the thrips is indicated by small dots or lines which usually run parallel with the leaf veins and remain white. The spot produced by the leaf hopper, on the other hand, while at first pale, later changes to a brown or black color. Furthermore, if the leaf hoppers are the guilty parties, the fact will usually be recognized by the presence of their molted skins, some of which, at least, will usually be found clinging to the leaf or grass blade.

The injury to plants by the *Cicadellidæ* may be divided into two groups. First, the sucking of the plant juices till the plant is killed or its vitality so reduced as to result in a reduced yield of food or fruit. Second, the transmission of plant diseases. Much work has been done on the former group by Professor Osborn, and on the latter by Doctor Ball. In the following discussion I have drawn very largely from the work done by them.

The matter of the reduction of the yield due to the sucking of the plant juices, is rather a peculiar one. Or perhaps it reveals a rather peculiar turn of mind in mankind. I believe it shows that there is still a great field of development for economic entomology and a field which should receive much attention.

In the main, agriculturists and many entomologists have turned their attention to fighting those insect pests which do very visible and usually a very serious amount of damage. The average farmer will at once notice a pest that will destroy, in a mass, several rows of his corn. Or he would notice at once, and fight with all his energy, anything that picked out about every tenth hill and utterly destroyed it, though not touching the other nine hills. But the same man seemingly pays no attention to any pest that reduces in the aggregate the yield of the whole field to the amount that would have been produced by the destroyed rows or by the every tenth hill, as long as he sees no very apparent and severe damage and the field as a whole seems to be doing fairly well. The same would apply to wheat and oats, rye and barley, alfalfa and clover, prairie hay and pasture. The question ought to be. not how much did the field raise, but what could such a field yield if no damage whatever be done by injurious insects?

No matter what the crop, or what any one's views may be as to the damage done by leaf hoppers, all must agree that every little bug takes some of the life juices that belong to the plant, and that this multiplied by hundreds or thousands cannot but help reduce the yield of the crop infested. So it is with this thought in mind, namely, that we ought to strive after the best possible yields, yields not hampered nor reduced by insect pests, that we turn to discuss the damage done by leaf hoppers to the various crops.

The damage done by reducing yields may be divided into four heads:

1. Damage to forage crops and pastures.
2. Damage to grains.
3. Damage to orchards, vineyards and gardens.
4. Damage to shade trees and ornamental plants.

The total value of our forage crops would be hard to estimate and also to overestimate, for under this head would come the leguminous crops such as the clovers and alfalfa, the hay crops both wild and cultivated, and the immense amount of food furnished by pastures. The following table, copied from Hitchcock's textbook on grasses, will give some idea of the tremendous importance of such crops in a single year, 1909:

	Acres.	Production (Tons).	Value (Dollars).
Timothy alone	14,686,393	17,985,420	188,082,895
Timothy and clover mixed......	19,542,382	24,748,555	257,280,330
Clover alone	2,443,263	3.158,324	29,334,356
Alfalfa	4,707,146	11,859,881	93,103,998
Millet or Hungarian grass......	1,117.769	1,546,533	11,145,226
Other tame or cultivated grasses,	4,218,957	4,166,772	44,408,775
Wild, salt or prairie grasses....	17,186,522	18,383,574	91,026,169
Grains cut green...............	4,324,878	5,367,292	61,686,131
Coarse forage	4,034,432	9,982,305	46,753,262

Thus we find nearly 75 million acres of land devoted to producing forage crops, yielding annually nearly one hundred million tons valued at over 800 millions of dollars. For today all these figures, especially that of the value, must be decidedly low. Then too they do not include the immense value of the forage produced by the millions of acres of pastures.

The amount of loss to such crops due to insects is hard to estimate and it is still more difficult to correctly determine the amount of injury due to one group of insects when there are many different kinds infesting the crop. But we are perhaps safe in saying that by far the most numerous and widespread of the insects affecting such crops are the leaf hoppers, and that a goodly share of the shrinkage in such crops, due to insect pests, is due normally to these forms. It will require much more accurate and persistent experimenting than has yet been done to enable us to be at all dogmatic about the exact relation of the *Cicadellidæ* to the forage crops, but yet, thanks largely to Professor Osborn's work, we can safely accept some facts, while holding others in abeyance till further work is done.

The seriousness of the damage to the forage crops depends of course on the number of leaf hoppers present. Not much has been done to get accurate data concerning their numbers, but Professor Osborn has found that frequently the numbers run up far above a million per acre, and he is of the opinion that in such grasses as timothy and blue grass, a million per acre would not be putting the figure too high. In work on the potato-leaf hopper Doctor Ball has found that in the period of their greatest abundance several million leaf hoppers may be found to an acre of potatoes.

Then, as to the amount of food taken by this number of leaf hoppers from the plants of that acre, and the resultant depreciation in weight of the amount of hay cut, we again have no definite figures because of the lack of experimentation. But after years of observation, Professor Osborn gives as his opinion that in some cases at least, from 25 to 50 per cent of the growth of such grasses may go to feed the leaf hoppers.

In Bulletin 248 of the Maine Agricultural Experiment Station, Professor Osborn gives some idea as to the leaf-hopper damage to the hay crop of that state. In 1913 there were 1,194,000 acres of hay in the state, which yielded about a ton of hay per acre, the value of the crop being over sixteen and a half million dollars. That acreage should have produced two to three times as much as it did, and if leaf hoppers are responsible for even ten per cent of such shrinkage, their damage becomes very serious and their control should call for serious attention. Applying these figures to the hay crop of the entire country, we see that at the very conservative estimate of a ten per cent loss, the leaf hoppers reduce the hay yield by at least ten million tons, valued in 1909 at about 80 millions of dollars and to-day at perhaps fully twice that sum. Thus these insignificant little creatures become a cause for real consideration, for at the very least, if the above estimates be anywhere near the truth, we can safely accuse them of causing an annual loss of 100 million dollars to the hay crop.

But there is still more to this problem than the mere decrease in yield. Professor Osborn, in the above-mentioned bulletin, also considers the effect upon the quality of hay produced, and shows that hay that has escaped the attacks of such insects is of much more value than a similar amount of hay that has been infested by them, for the former seems to show a distinctly higher percentage of protein and fat than the latter. If further investigations along this line confirm this, it makes the case against the leaf hoppers even more serious.

Attention should be called at this point to the fact that all the above figures apply only to the cultivated forage crops. Pastures are injured fully as much, if not more, than all the cultivated crops. But even if we apply the same figures as the above, and accuse the leaf hoppers of reducing the value of the pastures by ten per cent, we add to their debt a tremendous figure, for the value of such pastures is very great.

The species concerned in damaging forage crops are many, but several stand out as distinctly more serious than the rest. Seriously injurious to the leguminous crops is *Aceratagallia sanguinolenta,* commonly called the clover-leaf hopper. Gibson states that as many as 600 of these have been counted on a single plant, and that aside from the drain upon the plant the egg punctures cause gall-like formations in the surrounding tissue. *Empoasca mali* is also accused of being sometimes injurious to this crop. *Dræculacephala mollipes* is to be considered a serious pest of grasses as well as of grains. Others of great importance are *Deltocephalus inimicus, affinis, sayi, balli, Euscelis exitiosus, Phlepsius irroratus,* and *Cicadula 6-notata.* All the above are very common in Kansas. In some parts of the country *Dræculacephala reticulata* and *noveboracensis, Deltocephalus configuratus, Acocephalus striatus* and *albifrons,* and *Helochara communis,* the last in low lands, are also considered as more or less injurious to grasses. In central and western Kansas the native pastures, composed largely of *Bouteloua* and *Buchloe,* are very heavily infested with various species of the genus *Aconura.*

Coming now to the relation of leaf hoppers to the grain crops, we find many instances where wheat, oats, corn, rye, and barley have been injured. In Bulletin 108 of the United States Department of Agriculture, Professor Osborn gives a list of recorded serious damage by these insects. The sharp-headed grain leaf hopper, *Dræculacephala mollipes,* is undoubtedly the most serious of such forms, but such species as *Dræculacephala reticulata, Deltocephalus inimicus, Euscelis exitiosus,* and *Cicadula 6-notata* have also been recorded as doing some damage.

The damage to orchards, vineyards and gardens is perhaps not as serious as the damage to the forage crops and grains, yet here too we find serious damage at times. Few of our fruit trees are at all seriously infested with leaf hoppers. About the only species that seem at all troublesome are *Empoasca mali* and *Typhlocyba rosæ.* The former Mr. F. H. Lathrop reports as injuring apple, which it infests along with *Empoasca unicolor* and *Typhlocyba rosæ,* producing "a severe and characteristic curling of the foliage and resultant injury to the tree." The damage done by *Typhlocyba rosæ* is described by Mr. Leroy Childs as follows: "The insects during their twenty-nine to forty days of nymphal development are constant feeders, and when present in numbers are capable of removing much food that would otherwise be utilized by the plant. One insect feeding continually on an apple leaf during this period removes or destroys from one-third to one-half of the green chlorophyll. Four or five insects have been observed to remove, with the possible exception of a narrow green margin on the edge, the entire green coloration of the leaves. An injury of this extent, in the case of a general infestation over the tree, noticeably inhibits normal functioning of the leaves. Trees so infested appear yellowish-brown during late summer and are much below normal in vigor.

"The insects confine their feeding to the under surfaces of the leaves entirely. The first indication of their presence is the appearance of yellow spots on the upper surfaces of the leaves. As feeding continues these spots become larger and more numerous until the leaf shows a decided greenish-yellow coloration. Leaves so injured are deprived from further functioning and their presence on the tree only further devitalizes it by acting as surfaces for evaporation. In cases of a severe infestation many of the injured leaves drop prematurely during the latter part of August."

Other fruit trees, such as plum trees, are frequently infected with leaf hoppers, but no appreciable damage seems to result.

The damage to vineyards by several species of leaf hoppers is very severe and either involves the outlay of considerable expense for spraying or else greatly reduces the amount and quality of the crop as well as lowering the vitality of the vines. The chief species concerned here is *Erythroneura comes* and its several varieties, although *Erythroneura tricincta, illinoiensis, obliqua, crevecœuri* and others are frequent feeders on the grape. The bulletins by Slingerland, Quayle, Hartzell and Johnson fully deal with the damage and control of these forms.

Leaf hoppers as a group do not seem to injure garden crops seriously. But there are a few species that at times do serious damage. Notably injurious here is *Empoasca mali*, which is a serious pest of such crops as beans and potatoes. Here also comes the injury to sugar beets by *Eutettix tenellus*. The injury by these species in this case, however, has to do with the relation of leaf hoppers to plant diseases, and will therefore be discussed under that head.

In the cotton-growing region several members of the subfamily *Cicadellinæ* have been considered injurious to the cotton, though Sanderson seems to doubt their having any effect on the plant. The supposedly injurious forms here are *Homalodisca triquetra*, *Aulacizes irrorata* and two species of *Oncometopia*. Essig gives *Cicadella atropunctata* as injurious to such plants as blackberry, grape, lemon, orange and raspberry.

It can perhaps hardly be said that leaf hoppers are injurious to shade trees. While a large number of species normally live on trees, and others at times may infest them, yet no really serious injury seems to have been reported. Thus the members of the genus *Idiocerus* are largely confined to willows, cottonwood and *Cratægus*. *Cicadella hieroglyphica* and its varieties, many species of *Macropsis* and some species of *Empoasca* occur on willow. *Bythoscopus apicalis* is confined to honey locust. *Oncopsis distinctus* lives on walnut, a *Scaphoideus* on elm, *Typhlocyba lethierryi* on hard maple. The nearest to real injury to shade trees ever seen by the writer was observed on noticing the decolored condition of the leaves of a young sycamore tree. On examination the leaves were found to be heavily infested by an *Erythroneura*, the damage being very similar to that of the grape-leaf hopper to the grape.

The damage to ornamental plants also is not very serious. Few cases are recorded of any such damage. It is sufficient perhaps here to note the work of the rose-leaf hopper which, in parts of the country, seriously injures rose bushes, the damage being similar to that on the apple by the same species. The writer has noticed a few leaf hoppers in greenhouses but seemingly they are never present in large enough numbers to demand attention.

When we turn, however, from the damage done by the *Cicadellidæ* by the mere sucking up of the sap of the plant, to the possible and proved relations of the insects to the transmission of plant diseases, we enter at once an open and a very important field. We will discuss this phase of the economic importance of the group under the following heads:

1. Leaf hoppers and bacterial diseases.
    - *a.* Leaf hoppers and curly-leaf.
    - *b.* Leaf hoppers and fire blight.
2. Leaf hoppers and hopperburn.
3. Leaf hoppers as possible disseminators of fungous diseases.

The relation of leaf hoppers to the transmission of bacterial plant diseases opens at once a very large and important field. Who knows but what these and related insects are responsible for many of the diseases that have hitherto baffled the plant pathologist and been the despair of the farmer and horticulturist?

Doctor Ball's excellent work has opened up the way for the future on this line. He seems to have proved definitely that such insects may be the normal disseminators of plant diseases, just as, in the case of the mosquito, they are responsible for spreading animal diseases. After years of work on the beet-leaf hopper and its relation to curly-leaf in the sugar beet, among others, the following facts, quoted from his bulletins, were proved:

"The punctures of the beet-leaf hopper (*Eutettix tenellus*) cause a specific disease in sugar beets called 'curly-leaf.'

"Leaf hoppers taken from wild plants did not transmit the disease until they fed on diseased beets. Three hours on a beet rendered them pathogenic, but they could not transmit till after an incubation period of one or two days.

"Curly-leaf has never been produced except through the punctures of a beet-leaf hopper. If a single leaf hopper is applied to a beet for five minutes, the curly-leaf disease will appear after about two weeks, if conditions are favorable."

The above facts, added to the fact that the bacterial agent, *Bacillus morulans,* has been isolated by Boncquet, show conclusively that these insects may be responsible for similar plant diseases. And since the amount of damage done in such cases is very large, the field should prove both interesting and important.

Not very much has been done on the relation of insects to the transmission of *Bacillus amylovorous* which causes "fire blight." Doctor Merrill has worked on the relation of aphids to the spread of this disease, and Mr. F. H. Lathrop has done some work on the relation of *Empoasca mali* to the same disease. The latter reports that while in the tests *Empoasca unicolor* and *Typhlocyba rosæ* showed negative or doubtful results, *Empoasca mali* seemed to be a positive agent in the spread of the bacteria and in the infecting of new shoots. Should this work be confirmed we would have a practically untouched field opened to us, which, with careful work, might better enable us to be victors in the fight against this serious disease.

But we are not yet through with *Empoasca mali*. Again it is under indictment, this time for producing what should be called "hopperburn," especially on potatoes. Here again we are indebted to Doctor Ball, who seems to have shown that this insect produces much of what in the past has gone under the name of "tipburn." Furthermore, that hopperburn is perhaps a disease similar to curly-leaf, and that it differs from tipburn by readily-told characteristics, the latter being the result of purely physiological conditions. In the past two summers great damage has been done by this disease, if such it shall prove to be, but for which this leaf hopper alone seems responsible.

Again, leaf hoppers may prove to be disseminators of fungous diseases. Any insect of course may play this rôle, but because of their feeding and egg-laying habits, combined with their jumping disposition, they seem to be especially suited to transmit such fungi from plant to plant and thus spread the disease. This is a field as yet untouched that might yield discoveries of importance to the agriculturist and horticulturist.

Perhaps this discussion of the economic importance of the group would not be complete without a brief résumé of the methods of control. This consists in using natural farming methods and spraying. The chief ways to control the species damaging forage and grain crops would be those of rotation and clean farming. These of course are the best for the soil and are also the way to check insects. Most of such forms hibernate in the egg stage under the sheath of the grass blades. If therefore the places where such grasses occur, such as the fence and hedge rows, the corners, and land adjoining fields, be burned over in the winter, there will follow a great diminution of the hoppers the following season. Pastures especially should be burned over once in two or three years if they are seriously infested with these insects. The time of planting certain crops, and the time of mowing grasses may be so regulated as to result in escaping serious injury from the leaf hoppers. Thus Gibson reports that cutting the alfalfa crop from a week to ten days earlier will often check the clover-leaf hopper. If a crop is mowed so as to catch most of the leaf hoppers in the egg or nymphal stage the majority of the eggs will be destroyed and most of the nymphs will starve before they can migrate to other food.

Hopperdozers are sometimes used as direct controls to catch and destroy large numbers of the leaf hoppers when they are present in unusual numbers.

In the case of grain fields best results are obtained by plowing as soon after harvest as possible and then keeping the ground free from grass and weeds till planted. This, combined with rotation and clean farming around the edges, would be insurance against leaf-hopper damage. The beet-leaf hopper is also controlled by cultural methods.

The leaf hoppers in vineyards are mainly controlled by spraying, though hopperdozers are sometimes used. The usual spray material is "Black Leaf 40," 1 part to 1,500 or 1,600 parts of water, applied at the time of the presence of the maximum number of nymphs. Doctor Ball gives the same contact insecticide for the control of *Empoasca mali* on potatoes, using it at the rate of one pint to 100 gallons of water with five pounds of soap added, two applications to be made a week or ten days apart. The rose-leaf hopper and forms doing similar damage can be controlled in the same way. Mr. Childs suggests also the use of the rose as a trap crop in the control of the latter as an apple pest.

At this point we may also call attention to another bad habit of *Empoasca mali.* In Psyche, XXV, p. 101, 1918, Mr. George Becker called attention to this species attacking man. The writer has had several people tell him about being bitten by little green leaf hoppers, but not till a short time ago did he have any personal proof of the fact. One night, while collecting under a light, he felt a little prick on his hand, and on looking down saw a little green leaf hopper at work. It was secured and proved to be the species mentioned.

The matter of such biting brings up an interesting question, for so few of the Homoptera have ever been known to be guilty of such conduct. In fact, outside of the occasional piercing of Cicadas, the writer does not know of any other members of this order that have been recorded as attacking man. Whether they merely prick the skin because it is their nature to be piercing something or whether they are really fond of an occasional meal of blood would be an interesting question for determination.

From the foregoing discussion of the economic importance of the group it will be seen that it is necessary to know which are injurious species and which are not. Hence the value of a systematic study of the group and an acquaintance with its forms, so as to be able to single out those of economic importance.

Life History.

The life histories of a majority, even of the economic species of *Cicadellidæ,* have not been fully worked out. Some have, however, been worked out in detail, so that it is fairly easy to give a general life history for the group.

These insects belong to an order in which the metamorphosis is incomplete, that is, there is no distinct pupal or quiescent stage in the life cycle. It would, however, be better to speak of them as having a gradual metamorphosis rather than an incomplete one, reserving the latter term, as pointed out by Professor Comstock, for such water forms as dragon flies, which do not resemble the adult at all in their imperfect stages and yet cannot be said to have a complete metamorphosis. Thus there are three stages in their life cycle, namely, egg, nymph and adult.

The female leaf hopper is provided with a strong enough ovipositor to enable her to push the eggs in under the covering of some plant tissue. There is of course a great deal of difference in the different groups, and even among the species of the same genus, in the kind of material chosen for egg deposition, it being the rule that the eggs are always deposited in the kind of plant which is to furnish food for the nymphs on emerging.

In general it may be said that grass-feeding species deposit their eggs either between the sheath of the blade and the stem, or else in the margin of the leaf, where a layer of epidermis covers the egg. In either case the eggs are protected by a part of the host plant. Other forms deposit their eggs in the veins of leaves or sometimes under the epidermis in the tissue between the veins. Such is the case with the grape-leaf hopper, the potato-leaf hopper and a host of others. Still others deposit eggs in the stems of their host plants. This is true of such forms as the rose-leaf hopper, the apple-leaf hopper (*Empoasca unicolor*) and others. Some, such as the clover-leaf hopper, deposit their eggs either in the leaves or the stems of their host plant. In a few cases also the same species may oviposit alternately in two different hosts. This has been shown to be the case with the rose-leaf hopper, the overwintering eggs being deposited in the rose, while the eggs for the second generation are deposited in apple. Here we seem to have a good case of alternation of ~~generations~~ hosts, for only a very small percentage of these insects remain on the apple, their summer host, to deposit overwintering eggs. Of course where a species is a general feeder, it may oviposit in any of its host plants.

The eggs are usually whitish, elongate, and often slightly curved. Before they hatch the eyes of the nymphs are usually seen as distinct reddish spots.

Comparatively little is known concerning the number of eggs deposited by a single individual. In some cases the number seems to be quite low, while in others it is rather large. Some grass-feeding species deposit a few eggs together; others as many as fifty side by side. Osborn states that *Parabolocratus viridis* may lay as many as 120 eggs in a single hour. Of course eggs deposited under the sheaths of the grass blades are more readily found than those deposited in the leaf or stem. In the case of the latter, however, a blister-like swelling seems to develop around the eggs shortly after deposition, which helps in locating them, or the leaf may be held up to the sunlight and the eggs often discovered.

The period of incubation varies greatly in length. Eggs laid in the fall hatch the following spring or summer, the egg stage thus lasting several months. Eggs laid in the spring or summer hatch in varying lengths of time. Osborn gives an average of about a month for the duration of the egg stage of *Dorycephalus platyrhynchus,* and 10 to 17 days for *Deltocephalus inimicus.* Gibson gives 5 to 17 days as the length of the incubation period for eggs of *Aceratagallia sanguinolenta* during the summer in the latitude of southern Illinois, and from 3 to 35 days, with an average of 12 days, depending upon the temperature, for eggs of *Dræculacephala mollipes* in southern Arizona.

The nymphs are readily recognized as the young of Cicadellids, usually having more or less of the form of the adult except for the wings, though usually lacking most of the coloration of the adult till just before or after the last molt. During the nymphal stage the wings are represented by wing pads which gradually increase in size, but even just before the fifth or last molt they are much smaller than the wings of the adult.

Not only do the nymphs usually look like the adults, but they usually act like them too. They have the curious habit of running sidewise which is so characteristic of the family, and are also capable of jumping, as are the adults, though they are not as active as are the perfect forms.

The number of molts is usually, if not always, five. There are some records of but four molts in some forms, but if true, it is only so of a very few species. Molting occurs nearly always on the under side of the leaf, and here the molted skins may readily be found, for they are usually firmly attached to the leaf.

The length of the nymphal stage varies greatly in the different species. A few species overwinter as nymphs, in which case this stage lasts for several months. In summer, however, the nymphal stage usually lasts for several weeks. Thus Gibson gives 18 to 35 days, with an average of 25, for the length of the nymphal stage of the clover-leaf hopper, and 20 to 51 days, according to temperature, for *Dræculacephala mollipes* at Tempe, Ariz. Johnson gives from 19 to 37 days for the duration of the nymphal stage of the grape-leaf hopper in the Lake Erie valley. Childs gives above 35 days for the first brood nymphs of the rose-leaf hopper, and about 24 days for those of the second brood in Oregon. Osborn gives ten months as the length of the nymphal stage of *Dorycephalus platyrhynchus,* for this species overwinters as a nymph.

But very few attempts have been made to determine the length of the life of the adult. Childs, however, has given us some interesting data on this point. He found that the males of the first generation of the rose-leaf hopper die in from four to ten days after mating. Fertile females he found to live a month to a month and a half after mating, while unmated females live very much longer, some specimens being kept for 70 days, and a single one for 116 days, death in both cases being due to starvation. Individuals of the second brood were kept alive for 129 days. The unmated male, he states, lives a much shorter period. Of course it is well known that in the case of species which hibernate as adults, both males and females live several months.

The overwintering of the leaf hoppers is varied. Many pass through the winter as adults, a few as nymphs, and the majority perhaps as eggs. But no set rule can be given regarding the habits of any group, for even within the genus we do not find uniformity as to the condition in which hibernation occurs. Thus *Empoasca mali* overwinters as an adult, while *E. unicolor* hibernates in the egg stage. The nearest that we dare come to generalizing may be to state that the majority of species which oviposit in grass, pass through the winter in the egg stage, while a large number of those ovipositing in trees hibernate as adults. It seems, therefore, that the greater number of our forms overwinter in the egg stage.

The hibernating adults are often found under leaves and rubbish in the woods. This is especially true of many *Typhlocybini.* Of course where the winters are warm, we can hardly designate any stage as the hibernating stage, for under favorable circumstances they may breed throughout the year.

The number of generations per season is also an interesting question. Should we generalize we would say that the majority of species have two generations in a season. As to the rest, some undoubtedly have three or more generations, while some have only one. Thus Gibson claims three generations a year for the clover-leaf hopper in southern Missouri and four or more further south. Professor Osborn says there are two generations a year of *Dræculacephala mollipes* in Ohio, while Gibson claims six for southern Arizona. Others, like *Empoasca unicolor*, have but a single generation. Most members of the genus *Deltocephalus* have two broods, as do such forms as many members of the genus *Euscelis* and many of the *Typhlocybini.*

Natural Enemies.

In one of his bulletins Professor Osborn has given quite an extended account of the natural enemies of the leaf hoppers. We will do little more than to give the substance of this and of one or two other papers, for comparatively little work has been done on this line.

The natural enemies of the leaf hoppers may be divided into four groups, as follows:

1. Predaceous enemies.
2. Parasitic enemies.
3. Fungus diseases.
4. Climatic conditions.

The predaceous enemies of leaf hoppers do not seem to be an important means of control. Among such enemies are the birds, but even such active foes do not seem to be very efficient in controlling them. It has been found that while a goodly number of birds feed upon Cicadellids, yet in the aggregate such food forms but a small part of their dietary. Professor Osborn sums up the relation of birds to leaf hoppers as follows:

1. 119 species of birds are known to feed upon leaf hoppers.
2. Only 700 out of 47,000 bird stomachs examined contained leaf hoppers, or less than one out of every fifty.
3. The leaf-hopper content of a majority of these stomachs was only from 1 to 10 per cent, so that not more than one-thousandth part of the food of birds can be composed of leaf hoppers.

Domestic birds such as turkeys and chickens are said to feed on leaf hoppers, but their inroads on such insects could not be considered as serious.

Toads and frogs, being insectivorous, should use a small proportion of leaf hoppers in their dietary. Gibson states that the former has been observed feeding on them in alfalfa fields.

Among the *Arthropoda* themselves we find perhaps the most efficient predaceous foes of the leaf hoppers, though all combined do not seem to do anything appreciable in holding them in check. Various spiders and mites are said to be among such enemies. Slingerland and Johnson give the names of mites predaceous on the grape-leaf hopper in their bulletins on that species. Childs gives a list of spiders preying upon the rose-leaf hopper, while Professor Osborn gives a large list of spiders that have been known to feed upon leaf hoppers.

Insects themselves furnish several predaceous enemies. Thus Osborn mentions such enemies among the *Nabidæ* and *Lygaeidæ.* Quayle mentions ladybirds, aphis lions and ants as enemies of the grape-leaf hopper, while previously, Walsh, Glover and Slingerland had recorded one of the dance flies, a soldier bug, and the larvæ of *Chrysopa,* respectively, as also feeding on the same leaf hopper. Johnson accuses a Capsid of attacking this species also. Gibson mentions the agricultural ant as an enemy of *Draeculacephala mollipes.* Childs records a Scatophagid as an enemy of the rose-leaf hopper and also observes that dragon flies have been observed attacking that species. The writer one evening observed some damsel flies flying over the grasses near the edge of a pond. They so evidently seemed to be hunting that they were closely watched and were soon seen to be attempting to catch some very small Locustid nymphs and also to be after the leaf hoppers. Several times the leaf hoppers were seen to escape by their characteristic shift to the under side of the grass blades. Finally a damsel fly was observed to have caught one of the hoppers, and we were able to get close enough to identify the species as *Deltocephalus inimicus* and to catch the predator, not, however, before the last sign of his meal had disappeared.

There are records of at least two families of wasps that provision their nests with leaf hoppers. Comstock states that the *Nyssonidæ* provision their nests with the immature stages of these insects. F. X. Williams described a member of this family, *Harpactus gyponæ,* from Grant county, Kansas, which used the adults and nymphs of *Gypona cinerea* for this purpose. He found also that *Mimesa argentifrons,* a member of the family *Mimesidæ,* provisioned her nest with *Euscelis exitiosus.* Further studies with these and related families of wasps might reveal the importance of these insects as natural enemies of the leaf hoppers.

The chief natural enemies of the leaf hoppers are the parasitic insects. These are undoubtedly responsible for holding these insects in check, so that they do only the usual amount of damage annually. Such parasites are found in the dipterous genus *Pipunculus* and among the *Strepsiptera.* But far more important than these are the hymenopterous parasites belonging to the subfamily *Anteoninæ* and to the family *Bethylidæ*. Dr. F. A. Fenton's paper on this group shows how extensive is the parasitization of leaf hoppers by these forms which parasitize the nymphs and adults. Professor Osborn states that sometimes 20 per cent of the individuals of some of our native species are thus parasitized. The members of the genus *Gonotopus* parasitize the majority of the *Jassini*, while *Aphelopus* is the only parasite of the *Typhlocybini*. Various hymenopterous egg parasites are also at times very efficient.

The relation of fungous diseases to leaf-hopper control is yet an open question. Only rarely have they been recorded as attacking these insects. Professors Garman, Webster, and Thaxter are seemingly the only ones reporting such cases. The first two give records of *Draeculacephala mollipes* being attacked by *Empusa grylli*. Professor Thaxter, in 1890, observed *Empusa* killing the grape-leaf hopper in Connecticut. It seems very probable, however, that in favorable seasons this or other fungi may play some part in the natural control of the leaf hoppers as they do for instance in the checking of the grasshoppers.

Climatic conditions undoubtedly play an important part in the control of insects. Thus many a foreign insect, on introduction to this country, has not been able to gain a foothold because of the different and untoward weather conditions. It is well known also that even some forms which have become more or less acclimated, as well as native forms, are often kept in check by extremes of heat or cold. Thus in Kansas very severe winters or very hot summers are known to prevent outbreaks of *Toxoptera*. Undoubtedly the same is true of large numbers of insects, and among them, of the leaf hoppers. Johnson quotes Trimble as observing in 1865 that when the thermometer reached 100 degrees Fahrenheit, thousands of the grape-leaf hoppers were killed. It is easily shown that grape-leaf hopper nymphs are killed by an exposure of a few minutes to the hot sun, so that it is very probable that when it becomes very hot, and host plants wither, that many may not be able to find sufficient protection and therefore succumb to the extreme heat. No one doubts also that untold numbers of individuals are destroyed by the extreme cold, freezes, and snows of winter, regardless of whether hibernation occurs in the egg, nymphal or adult stage. Actual experimentation with extremes of heat and cold, controlling also the moisture conditions, should give us interesting and perhaps very instructive data as to just what part climatic conditions do play in the control of such insects.

Geographical Distribution.

Leaf hoppers are so well distributed over the earth that they are truly cosmopolitan. They are well represented in all the faunal realms, and in some countries are among the commonest of the insects. In his catalogue of the Hemiptera of America north of Mexico, published in 1917, Mr. Van Duzee lists about 700 species, and the number now known must be well beyond that. I have been unable to get any estimate of the total number of species known to science.

Professor Osborn has pointed out two facts of great interest when one views this group as a whole or when the fauna of two continents are compared. First, the fact is soon observed, that the leaf hopper fauna of even two widely-separated portions of the earth, are essentially and fundamentally alike in group characters. This is taken as showing a common origin of the groups. And second, that though in the main characters and larger groupings there are so many similarities, yet there seem to be relatively very few cases of specific identity between the species of such separated countries or continents. Examples of this fact are numerous when our own forms are compared with the European. The subfamily *Paropinæ*, for example, occurs on both continents, yet not one of our eight species seems to occur in Europe. Of our seventy-five or more members of the genus *Deltocephalus* only four are known to occur in Europe. And this is about the case in almost any group one may choose.

This fact would argue for an early separation of our forms from the European and for a consequently long development here. It would seem to indicate also that introduction of leaf hoppers into new continents, separated by oceans, is to-day rather rare if occurring at all. And when one considers the few adaptations of these forms for transmission, especially as to life history, one is all the more convinced that such introduction does not often take place. If such be the case it is evident that the distribution of the leaf hoppers over the earth must have occurred in the early times when the different portions of the earth were more connected than they are now.

That leaf hoppers, however, are able to push out the limits of their environment once they are in a country and unhindered by high mountains or climatic conditions essentially different from that to which they are adapted, is very evident. The range of many of our North American species is steadily being increased. Thus Professor Osborn shows that *Dræculacephala reticulata* seems to be steadily pushing northward from its southern home, seemingly having the power to adapt itself to such minor changes as it may meet. *Euscelis exitiosus* he also believes to have recently spread over the United States.

In the United States we find a rather general distribution of the members of this family with the exception of the *Paropinæ*. The members of this subfamily are seemingly confined to California or at least to the west of the Rockies. The *Bythoscopinæ* on the other hand, are found well across the states The *Agallia* group while found from north to south and east to west, is yet undoubtedly subtropical. The genus *Idiocerus* is in the main more northerly in its distribution. The members of the genus *Macropsis* are more abundant in the Northeastern states, few reaching the Pacific coast. *Oncopsis* is practically northern in its distribution, while the members of the genus *Bythoscopus* are well represented in the Western states though also occurring in the south and east. Thus in one subfamily we find groups which favor each of the several portions of the country in their distribution.

The *Cicadellinæ* are tropical or subtropical as a group. Naturally we therefore find the subfamily best represented in our Southern states though many species seem to have been able to adapt themselves to northern conditions and some are found commonly even in Canada. They occur across the continent from east to west. Only two or three of the nearly fifty species of the United States are known to occur in Europe. Many of them, however, are found in Mexico and the West Indies, some such region seemingly being their original home.

Comparatively few members of the subfamily *Gyponinæ* seem to be found on our western coast. As a group they seem to be tropical or subtropical and hence are best represented in our Southern states, though some species extend through our Northern states into Canada. They are found in the Eastern as well as the Western states.

Of the great subfamily *Jassinæ,* we find representatives in all parts of the United States. Here too, however, we see many restrictions to certain regions. Thus the genus *Acucephalus* is confined largely to the Northeastern states. *Cicadula, Thamnotettix* and others are largely northern, *Uhleriella, Aligia, Neocœlidia* and others largely western, *Spangbergiella* and *Acinopterus* essentially southern, while still others, such as *Deltocephalus,* seem to find their optimum conditions in the Middle West. Others are undoubtedly largely Rocky Mountain forms. Some genera, on the other hand, and even some species, seem to be able to find favorable conditions clear across the continent and from the north to the south, so that they may be spoken of as occurring throughout the United States.

Systematic Position.

The *Cicadellidæ* were formerly placed in the great order *Hemiptera.* Of late years the suborders of this order have been given ordinal rank, so that to-day we speak of these insects as belonging to the order *Homoptera.* This order undoubtedly stands as the highest among those insects which have an incomplete metamorphosis.

In the division of this order there seems to be a general disposition to follow Amyot and Serville in forming the two groups *Auchenorhynchi* and *Sternorhynchi,* the former to include those families in which the beak arises clearly from the posterior or lower part of the head, the latter including the families where the beak seems to arise from between the prothoracic legs. These groups may be further separated by the character of the antennæ and the number of tarsal joints. In the former the antennæ are usually awl-shaped or setaceous; in the latter they vary in form but are never bristle-like. The members of the former group also always have three-jointed tarsi, while the tarsi of the latter are composed of but one or two segments and rarely are lacking.

Some authorities in dividing the *Hemiptera* into suborders make the *Auchenorhynchi* equal to their suborder *Homoptera* and the *Sternorhynchi* to the suborder *Gularostria.*

Along with the *Cicadidæ, Membracidæ, Cercopidæ,* and *Fulgoridæ,* the *Cicadellidæ* belong to the *Auchenorhynchi,* and it is with this group that we are particularly concerned in discussing the systematic position of the leaf hoppers.

It now seems to be generally believed that the *Cicadidæ* are the lowest of these five families. Comstock and Needham pointed out in 1899, in a paper on the wings of insects, that this family had the nearest to the primitive condition of wing venation of any *Hemiptera.* Funkhouser does not believe that the wings of the *Cicadidæ* are as generalized as those of the *Membracidæ,* though agreeing in placing them below the latter in phylogenetic rank. This is Osborn's opinion also. The fact that they are the only *Auchenorhynchi* with three ocelli, the others having two or none, would indicate their more primitive condition.

It is quite commonly believed also by Homopterists that the *Fulgoridæ* represent the most specialized forms of this group. This opinion was held by Kirkaldy and Hansen and is held today by Funkhouser and others. One cannot look carefully at the wonderful antennæ of a large number of these forms without agreeing with this disposition of the family provided the development of the antennæ and its sensory organs be considered an important criterion. Certain it is that they must be placed by themselves, for it would be hard to try to connect them closely with any of the four other families of the group.

The three families, *Membracidæ, Cicadellidæ,* and *Cercopidæ* are now left for consideration. One cannot have even a casual acquaintance with these forms without realizing their similarity and close affinity. That they are all three derived from a common stem seems to be plainly evident. The question is as to their relative position.

Having made the *Cicadidæ* the lowest and the *Fulgoridæ* the highest families of the *Auchenorhynchi,* we must necessarily place the remaining families in between, so that we now have the *Cicadidæ* arising from a lower stem, the *Membracidæ, Cicadellidæ,* and *Cercopidæ* from a middle one, and the *Fulgoridæ* from a third and highest one.

When we study the families arising from this middle stem it seems that Funkhouser has made his point in claiming that the *Membracidæ* are the lowest of the three. This would put them next to the *Cicadidæ,* but as we have indicated, their relationship would not be so much with them as with the other families of the middle stem. In support of his position he shows that the *Membracidæ* have a very poorly developed sensory system, causing them to respond very slowly to stimuli, that the wings are very generalized, and that the genital organs are simple. In the first, if not in all of these respects, the *Cicadellidæ* and *Cercopidæ* are certainly more specialized.

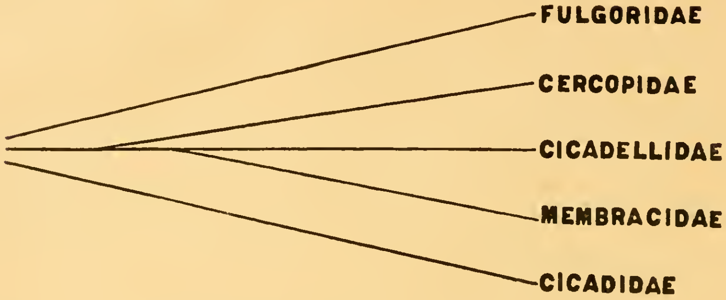
The question now arises as to which of these two families is closer to the *Membracidæ.* Here we are helped by a curious insect which seems to be half Membracid and half Cicadellid. I refer to *Æthalion,* an insect found in this country and in Central and South America. It looks very much like a Cicadellid, but instead of having a double row of prominent spines on the hind tibiæ, has those parts of the leg covered with weak spines or hairs quite promiscuously arranged. Here is an approach to the Cicadellid leg. On the other hand, it has certain very distinct Membracid characters though lacking the chief characteristic of the family, namely, the Membracid pronotum. So similar is this insect to both these families that entomologists have had much trouble in deciding to which it belongs. Stal placed it with the *Membracidæ,* but Ashmead included it with the *Bythoscopidæ.* Van Duzee places it under a subfamily of its own, as a Membracid, but as the form of that family closest to the *Cicadellidæ.*

Thus we seem to be safe in putting the *Cicadellidæ* next to and above the *Membracidæ* because of their better sensory system, and because of this connecting form. It is not at all improbable, however, that the *Æthalioninæ* will later be placed in a family by themselves, but in any case they would still constitute the link between these two families.

The *Cercopidæ* do not seem to show such close relationships to the *Membracidæ,* nor do they seem to be as closely connected with the *Cicadellidæ* as is this family to the tree hoppers. There seem to be no forms connecting them with the leaf hoppers, and yet their relationship with them and the tree hoppers is very evident. For this reason it seems probable that they are an older offshoot from this middle stem than either of the other two, and this would seem to be evidenced also by their peculiar life history.

It seems probable that the nymphal habit of enveloping themselves in a mass of spittle could not be a habit easily or quickly developed. That it is a protective habit is certain, for as Dr. F. A. Fenton has shown, while large numbers of Cicadellids and Fulgorids, also a Membracid, are parasitized by the *Anteoninæ,* we have yet to find a single instance of the parasitization of a Cercopid. Thus this habit has been long enough in development to have seemingly made it an absolute success in the protection of these insects from their parasitic foes. So that considering their specialized life history, along with their morphology and the absence of intermediate forms between them and the Cicadellids, we would place the *Cercopidæ* above the latter and have them leaving the middle stem before the Membracids and Cicadellids.

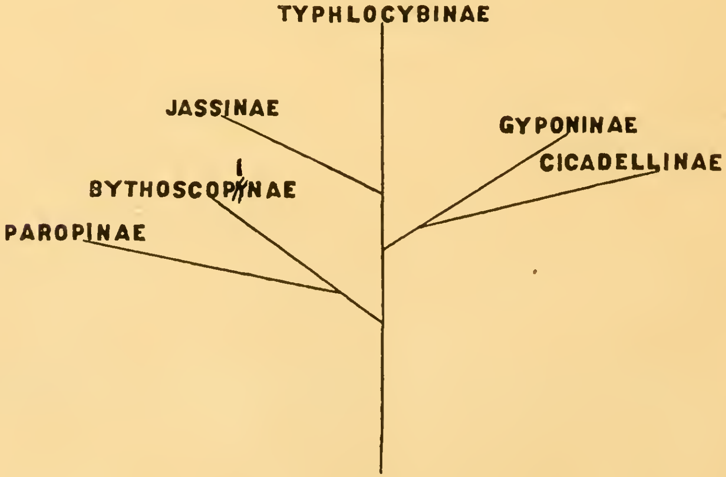
Diagrammatically this phylogenetic relationship would be expressed as follows:


FULGORIDAE
CERCOPIDAE
CICADELLIDAE
MEMBRACIDAE
CICADIDAE

When we consider the relationships of the different subfamilies of the *Cicadellidæ* we again find opportunity for differences of opinion. Van Duzee in his catalogue arranges them in the following order, beginning with the lowest:

Paropinæ.
Bythoscopinæ.
Cicadellinæ.
Gyponinæ.
Jassinæ.

Dr. F. A. Fenton in his paper on the parasites of leaf hoppers gives the following phylogenetic tree for these subfamilies:


TYPHLOCYBINAE
JASSINAE
GYPONINAE
CICADELLINAE
BYTHOSCOPINAE
PAROPINAE

Here the tribe *Typhlocybini* has been removed from the *Jassinæ* and given subfamily rank, the phylogenetic arrangement, however, agreeing with that of Van Duzee, whose arrangement seems to be quite generally accepted.

A question that yet may have to be decided differently is that of the position of the tribe *Typhlocybini* or the subfamily *Typhlocybinæ.* In many ways they appear to be the highest members of the family. This is especially true of their wings which show very evidently a specialized condition as compared with the wings of the members of the other subfamilies. The loss of the ocelli in some of the genera may also be taken to indicate specialization.

Gillette, however, in his monograph of the American members of the subfamily, calls them the lowest of the leaf hoppers, and there are others who at least partially share this view. In this connection the work on the parasites of these forms is rather interesting.

Fenton finds that the members of the tribe *Typhlocybini* are parasitized only by members of the genus *Aphelopus* and curiously enough Kornhauser finds that our only known Membracid parasite is a member of the same genus.

While we would not argue that this was any proof that the *Typhlocybini* are the closest leaf hoppers to the Membracids, and therefore the lowest of the *Cicadellidæ,* yet, if Kellogg can trace the relationships of seemingly unrelated birds through the agency of their parasites, may it not be possible to do something of the same kind here. If closely related *Mallophaga* are found only on closely related birds, may we not expect to find closely related parasites parasitizing closely related *Homoptera?* In fact do we not find this in the case of all insects? For certainly it would be easier for a parasite to adapt itself to parasitizing a closely related form than one distantly related. So that it may be that in a few years we may find the *Typhlocybini* to be not the highest, but among the lower, if not the very lowest of all the groups of this family.

PLATE I.

1. Dorsal view of *Phlepsius irroratus*. (*v*, vertex; *e*, compound eye; *p*, pronotum; *s*, scutellum; *c*, clavus; *es*, elytral suture; *cs*, claval suture; *co*, corium.)

2. Face of *Phlepsius irroratus*. (*f*, front; *e*, compound eye; *a*, antenna; *l*, lora; *g*, gena; *c*, clypeus; *lr*, labrum; *la*, labium.)

3. Metathoracic leg of *Phlepsius irroratus*. (*c*, coxa; *t*, trochanter; *f*, femur; *ti*, tibia; *ta*, tarsus.)

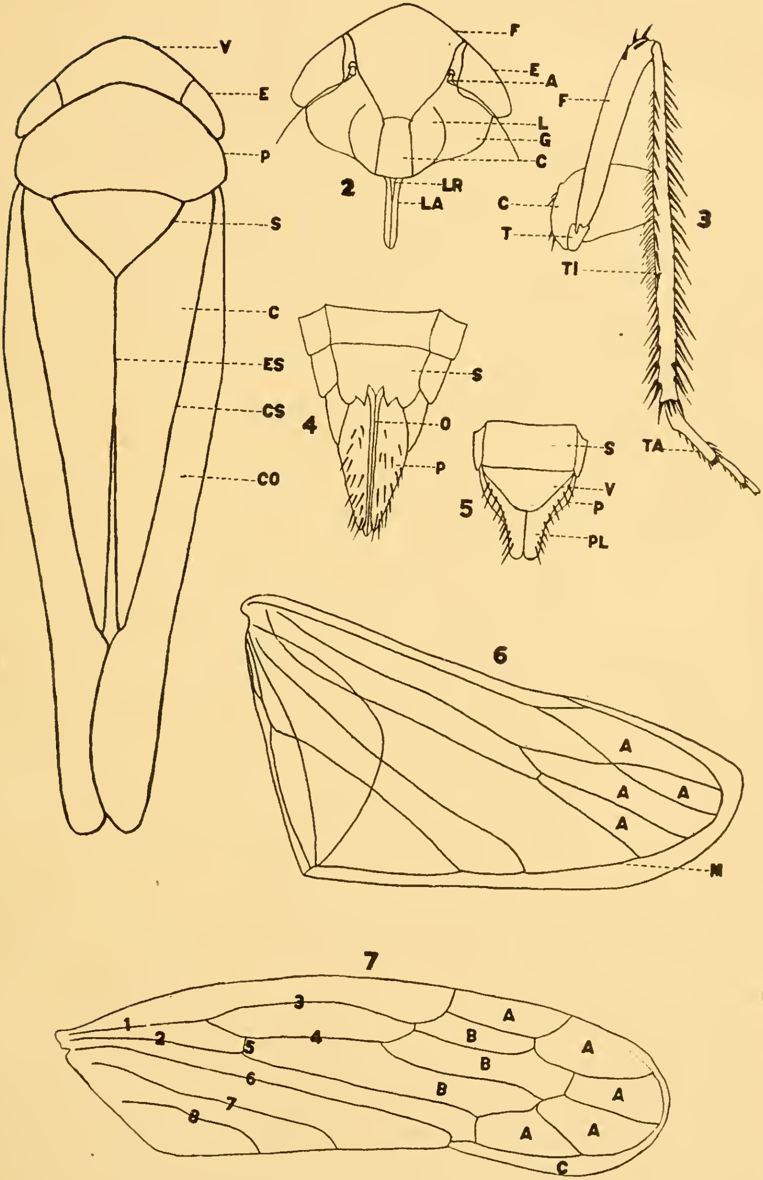
4. Tip of abdomen of female *Phlepsius irroratus*. (*s*, last ventral segment; *o*, ovipositor; *p*, pygofer.)

5. Tip of abdomen of male *Phlepsius irroratus* (*s*, last ventral segment; *v*, valve; *p*, pygofer; *pl*, plates.)

6. Hind wing of *Phlepsius irroratus*. (*a*, apical cells; *m*, marginal vein.)

7. Elytron of *Phlepsius irroratus*. (1, first sector; 2, second sector; 3, outer branch of first sector; 4, inner branch of first sector; 5, first cross nervure between sectors; 6, claval suture; 7, outer claval vein; 8, inner claval vein; *a*, apical cells; *b*, anteapical cells; *c*, appendix.)

PLATE I.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The Chief Morphological Features.

While there have been some attempts to work out the morphology of the *Cicadellidæ*, yet it does not seem that the subject has yet received much thorough investigation. Therefore in this paper we propose to give only as much information on the morphology as will enable one to recognize members of the family, and enable them to use the keys for their specific determination. It is hoped at some future time to carefully study the morphology, both external and internal, of the family.

As in all insects, the body of the leaf hopper is divided into three distinct regions, namely, *head*, *thorax*, and *abdomen*. The chief features of each are briefly described below and illustrated in the accompanying plate (plate I).

The upper or dorsal portion of the head is called the *vertex*. There is no distinct division between this portion and the rest of the head, but often there is more or less of a distinct margin between it and the face. The greater portion of the latter is called the *front*. It is not separated from the vertex by a distinct dividing line or suture, but is distinctly bounded laterally by sutures which frequently run past the antennæ clear to the anterior margin of the head. On the lower side or ventrally the front is bounded by a transverse suture. The *clypeus* is the rectangular sclerite attached to the anterior or lower edge of the front. The *loræ* are the rather semicircular sclerites on either side of the front and clypeus, while the *genæ* are the large sclerites extending from below the eyes and surrounding the *loræ*. It might be stated that Cogan claims that the clypeus proper is not clearly differentiated in the *Homoptera*, and that what is usually called the clypeus is really the *labrum* or upper lip.

The eyes are of two kinds, *compound* and *simple*. The former are always large and prominent and occupy a large part of the head. The simple eyes or *ocelli* are always small, and are lacking in many members of the *Typhlocybini*. In the *Paropinæ* and *Bythoscopinæ* they are situated on the front, below the margin of the vertex, in the *Cicadellinæ* and *Gyponinæ* they are situated on the vertex, while in the *Jassinæ* they are on or near the margin of the vertex.

The *antennæ* or feelers are always setaceous or bristle-like. They are on the face between the compound eyes and the front. The basal segments are large but soon they become very small. The number of segments is comparatively large. In the genus *Idiocerus* the antennæ are used in the differentiation of the species due to the possession in the males of variously-shaped, flattened discs at the apex.

The mouth parts consist of a large 3-jointed beak or *proboscis* which, in a groove on its anterior or dorsal surface, bears a minute triangular sclerite and two pairs of brown stylets which run its whole length. The former is claimed by Cogan to be the small *epipharynx*. By some it is thought to be the *labrum* or upper lip, and the membrane below it the epipharnyx. The inner pair of stylets constitute the *maxillæ*, while the outer ones are the piercing *mandibles*. The proboscis or rostrum is the *labium* or lower lip.

The thorax, as in all insects, is composed of three segments called respectively the *pro-*, *meso-*, and *metathorax*. Dorsally however, only two of these segments are seen. The large portion behind the head is the tergum or dorsal sclerite of the prothorax and is called the *pronotum*. The triangular sclerite back of the pronotum is a part of the dorsal sclerite of the mesothorax and is called the *scutellum*. The side pieces of the thoracic segments are called *pro-*, *meso-*, and *metapleuræ*, respectively.

The appendages of the thorax are the legs and the wings. Each of the three segments bears a pair of legs and the meso- and metathorax a pair of wings in addition. The legs have the usual segments, but the *tibiæ* are very long and very characteristically armed with a double row of stout spines. The *tarsi* are invariably 3-jointed.

The mesothoracic wings are thicker than the membranous metathoracic wings. The former are often called the *elytra* and a few speak of them as *tegmina*. In the accompanying plate the different parts of the wing are labelled according to the terms used in the following systematic treatise of the Kansas species. The metathoracic or hind wings are sometimes simply called the *wings*. They are much wider than the elytra and when at rest have the inner portion distinctly folded.

In the *Typhlocybini* their venation is of importance in the separation of the genera, otherwise they are not much used systematically.

The *abdomen* consists of a number of distinct segments, but the segmentation of the terminal portion is indistinct. Each segment consists of two pieces, a dorsal *tergum* and a ventral *sternum.* These are connected by *pleural membranes.* There are eight distinct tergites, the last one being called the *pygofer.* This sclerite is usually more or less divided caudodorsally and through this excision rises the *anal tube* which bears the *anus* at its apex. The question as to the number of segments composing the anal tube is an interesting one and one that requires careful study. In the female the pygofers nearly enclose the *ovipositor* which is composed of three pairs of *valves.* The pygofers are usually exceeded in length by the ovipositor.

The terminal sternites are of importance in classification. In the female, in many genera, the last sternite is characteristic of the species and is much used in differentiating them. In a comparatively few species this *last ventral segment* is described as being composed of an outer and inner membrane. This is the case in the *Deltocephalus compactus-weedi* group. It may be that a careful study with caustic potash specimens will reveal the existence of such a condition in many more, if not in all of the *Cicadellidæ.*

In the male the sternite just before the valve is called the *last ventral sternite.* The *valve* is usually a small and triangular sclerite situated just before the *plates.* In many genera the valve is described as lacking, but it seems more probable that it is never absent, but only apparently so because it is often overlapped by the last ventral segment. It is of great value in classification. In some genera, however, it cannot be much used.

Just caudad of the valve is a pair of usually triangular sclerites, called *plates.* These also are often much used in classification. They are fastened to the posterior margin of the valve. Their homology brings up a question yet to be worked out, for the question at once arises as to whether they represent the divided sternite of the ninth abdominal segment, or whether they are paired reproductive appendages, derived as are the other reproductive appendages from primitive locomotory organs. The *plates* vary much in size and shape in the different genera and even in species of the same genus. When viewed ventrally they frequently completely cover the pygofers, though often they are very small and much exceeded by the pygofers.

In systematic work on the *Cicadellidæ*, the last sternite, commonly called the last ventral segment, with the pygofers and ovipositor of the female, and the last ventral segment, valve, plates, and pygofers of the male, have been spoken of as the *genitalia*. In this paper they are spoken of as the *external genitalia* to distinguish them from the other, hitherto little used, more or less hidden genitalia, which, to distinguish them from the above, are here called the *internal genitalia*.

The Male Internal Genitalia.

The genitalia of the various groups of insects are being studied more and more both by the morphologist and systematist, for it is now well known that in many groups they are a very great help if not the chief means of separation and classification. Along with the venation of the wing, they have often furnished the chief characters for working out the systematic problems of many groups. Already much use has been made of them as witnessed by work on the *Melanopli* and other *Orthoptera,* many groups of the *Lepidoptera, Coleoptera, Diptera, Hymenoptera,* and other orders. Knight's paper on the genus *Lygus* is illustrative of their value in systematic work.

In the *Homoptera* some use has been made of the terminal portion of the abdomen in classification. The importance of the pygidium in the *Diaspinæ* is now well known to all, and the use of the terminal sclerites in the *Cicadellidæ* has done much to help in the differentiation of the species. As before mentioned, the pygofers, last ventral segment, and ovipositor of the female, and the pygofers, last ventral segment, valve, and plates of the male, have been the parts spoken of as the genitalia of this family. These are the parts that are external and are thus readily observed. There are other parts of the genitalia, however, which have been but little used and yet which it seems are of much importance and could be readily used, especially in cases where all other helps seem to fail. These portions are what we have called the "internal male genitalia," using the word "internal" merely to distinguish them from the ordinarily used organs which we have styled the "external genitalia." In reality these organs are not internal, being situated in an open genital chamber which is the "terminal chamber" of Sharp's *Pentatomidæ.*

These organs have been but little used in systematic work on the *Cicadellidæ.* Johnson in his bulletin on the grape-leaf hopper gives a drawing of them as he saw them in that species, but evidently no attempt was made to get at their connection with the abdomen and with each other. In his Hemiptera-Homoptera of the British Isles, Edwards occasionally makes a little use of these organs and figures portions of them, but again no effort was made to dissect them out and get at the relative differences in the various genera or species.

Hitherto Prof. Franz Then seems to have come the nearest to actually using these organs in systematic work on the leaf hoppers. In his papers on several members of the genera *Deltocephalus* and *Thamnotettix* he figures in a comparative way the internal genitalia of several species and shows that they vary characteristically for each species. His figures, however, do not show the details of form and structure nor the connection of the various parts.

The organs that we have placed under the heading of internal genitalia are three in number. These we have called the paired *styles*, the *style-œdagus* connective, and the *œdagus*.

The styles are always paired and fastened to the dorsal surface of the plates. At the point of their attachment to the plates the latter bear distinct ridges or chitinous thickenings usually near the antero-lateral margin. These styles are chitinous organs varying very much in shape. They are sometimes simply columnar in form, but most often triangular in outline. They are often fastened to the plates at about their middle, though usually nearer the anterior end. They vary much in their shape at either end in the different species, but most particularly in the form of the posterior end. There are also usually characteristic irregularities or processes along the margins. The greater portion of the styles usually projects out into the genital chamber and is therefore really external, but the anterior part of it always passes through the membrane forming the anterior wall of the genital chamber, and reaches into the body cavity, often reaching into the cavity of the seventh abdominal segment. Professor Then applied the term "Griffel" to a style. They are undoubtedly a pair of claspers.

The style-œdagus connective, or briefly, the connective, is a chitinous sclerite which connects the two styles and is also usually connected with the œdagus at its caudal extremity. I have been unable to find in the literature a homologous sclerite and hence do not know whether it has already been named. Professor Then called it the "Stutze." The term I have suggested for it is in keeping with his name for it also explains its function. It is undoubtedly used to coördinate the action of the styles in copulation and usually also with them, that of the œdagus. There are always more or less prominent processes on the mesal margins of the styles to which the connective is fastened. It varies much in the different genera being sometimes simply a transverse chitinous bar, at other times it is U- or V-shaped, and often is quite elongate and columnar in form. In rare cases it seems to have no connection with the œdagus and is then much reduced in size. The question of its homology seems to afford an interesting problem for future work.

The œdagus is commonly spoken of as the penis sheath. ~~In this case I believe it is the penis itself and the terms have been used synonymously.~~ Professor Then called it the "Membrum virile." It is also a chitinous sclerite, connected anteriorly with the connective. It assumes a great variety of forms and is often very characteristic even in closely-related species. Its base is usually quite enlarged or bears a more or less strongly developed dorsally directed process. This is for the purpose of fastening it to the wall of the genital chamber which is composed of the membranes that form the anal tube and the ental surfaces of the pygofers. The terminal portion of the œdagus is variously developed, sometimes simply, often with additional chitinous lateral or ventral processes.

In addition to the above it has been found that the pygofers themselves often bear chitinous bars or spines that are distinctive of the species. Thus the posterior margin of the pygofers often bears a characteristic tooth or lobe, and in the sides of these organs there are often characteristically shaped chitinous structures. In some genera moreover the dorsal margin bears chitinous bars which are specifically distinct and which in some genera are united anteriorly, forming a U- or V-shaped chitinous structure around the base of the anal tube. These structures are, of course, too small for superficial study, but because of being in the pygofers, are described, when present, with the external genitalia. They seem to be of equal importance in some cases with the internal genitalia in the separation of species and varieties that show no differences in the external genitalia.

It has been the purpose of this paper to study and describe these internal genitalia in representatives of the more important and common of our genera. Although this has been done for a goodly number of species, yet the real value of such work will not appear till a whole genus is worked, and then its worth will be readily seen. Accordingly what is here done is only to prepare the way for such work, to show that there are possibilities with the leaf hoppers on this line, to get acquainted with the structures, and gain experience in the necessary technique.

The technique employed is as follows: The specimens to be examined are first soaked in a ten per cent solution of caustic potash. The time they are left in the solution depends altogether on the size and color of the specimen. Light and delicate species are left for only two or three hours. Large and dark forms may require several days before they are clear. Care should be taken however not to leave small species in too long as they become too light. If plenty of material is at hand the whole specimen may be dropped into the fluid, otherwise only the abdomen or the tip of the abdomen need be used, thus retaining much of the value of the desirable specimen. For this soaking the specimens may be kept in small vials, each bearing a number, so that accurate records may be kept and the mixing of the species avoided. In this way the same vial of caustic potash can be used over and over again till the fluid becomes too dirty.

When thoroughly cleared up by the caustic potash, the specimens are removed into a watch crystal of distilled water. A watch crystal with the middle of its convex surface flattened is the best. This enables one to rest it without fear of tipping on the glass stage of a binocular. The particular binocular used was a Bausch & Lomb machine with a 32 mm. objective and 8x oculars. The watch crystal and stage both being glass excellent illumination can be obtained by using a spotlight on the mirror of the binocular. Minuten Nadeln are the most satisfactory dissecting needles for such work, ordinary dissecting needles being altogether too big for work with the smaller forms, particularly the *Typhlocybini.*

It was found best to first draw all the organs in situ from a lateral view. As accurate a drawing as possible was made in this way and any parts not clearly seen were later cleared up when the pygofers were torn open and the organs fully exposed to view. Then the styles may be torn loose from the plates and the œdagus from the membrane of the genital chamber, and thus the styles, the connective, and the œdagus be freed intact. These were then usually drawn in their normal position, that is a dorsal view of them was obtained. Thus with the previous lateral in situ view, and a dorsal view, a fairly accurate idea of these organs can be gained. Both these drawings were later verified and if necessary corrected when the mounted genitalia were studied with the higher magnification of the compound microscope.

The drawing of these organs was greatly facilitated by using, in one of the oculars, an eye-piece scale ruled into squares. The drawing paper was then ruled into inch squares corresponding to these squares. In this way drawings can be made quickly and accurately and with all the various species drawn to the same scale. Our drawings are about 40 times the size of the genitalia.

After they are dissected out and drawn, the genitalia are transferred to 95 per cent alcohol for a few minutes, then to xylol for a similar period, and finally mounted on slides in Canada balsam. A pin with a small loop in the end and with the other end fastened into a wooden handle is an excellent tool for the transfer of these tiny organs from one liquid to another.

As in other groups of insects it will be found that these genitalia show distinct and specific differences in some genera, while in others they are, for purposes of classification, of little or no value. In some cases however I believe they are practically the only criterion that will enable us to correctly decide between species and varieties, and also to decide the generic position of some forms, which though specifically distinct, yet give much trouble as to their true generic disposition.

The value of these internal genitalia may readily be shown in the little that has been done on the *Agallia* group. In their review of the members of this genus Osborn & Ball pointed out the existence of three groups within the genus. The differences between these groups, while based partly on adult characters, were more particularly indicated in the nymphs, which vary considerably both as to structure and life history. In 1907 Kirkaldy, recognizing the distinctions between these groups, gave to them subgeneric rank, and accordingly divided the genus into the subgenera *Agalliopsis, Agallia,* and *Aceratagallia.*

In the work on the internal genitalia of these forms, representatives of each were examined, and it was found that in these organs there are distinct differences between the members of the three subgenera, and that in each subgenus these organs, though differing specifically, are yet of the same general type. Thus in *Agallia novella,* a member of the subgenus *Agalliopsis,* the styles are each composed of two distinct sclerites, a condition not found in any member of the other subgenera. The œdagus is also characteristic of the subgenus, being much larger and with accessory lateral processes which do not occur in the other subgenera. Moreover, it was found that this species has, partially imbedded in the pygofers and partially free, a very peculiar and characteristic chitinous process corresponding to which there is nothing in the other subgenera.

Agallia constricta and *4-punctata* were then studied as types of the subgenus *Agallia.* Here the styles were found to consist of a single piece, and though distinctly and specifically different in the two species, were yet of the same type, each being somewhat club-shaped and terminating in two blunt apical processes. The œdagus also in each case was found to be of the same type and vastly different from that of *novella,* having an enlarged base and a long and curved terminal process. In *constricta,* however, it is much stouter and heavier basally than in *4-punctata.*

Agallia uhleri, sanguinolenta, and *cinerea* were next studied as representatives of the subgenus *Aceratagallia.* The three were found to agree in type of styles and œdagus which in the case of both organs was entirely different from that found in the other two subgenera. In this group the style consists of a more or less club-shaped basal portion and a broad flat terminal portion which has the mesal margin distinctly serrate. But the styles of the three species, while of the same type, are yet specifically distinct. Thus in *sanguinolenta* the terminal portion is drawn out into a long lateral tooth, while the style of *uhleri,* though much like it, lacks this lateral tooth. The style of *cinerea,* on the other hand, has the mesal margin strongly rounded apically, a condition not found in the other two, denoting the closer relationship of *uhleri* to *sanguinolenta* than to *cinerea*. These three forms agree also in having a small œdagus built on the same pattern but differing in minor details.

Thus it was found that representatives of these three subgenera, though each with its own characteristic genitalia, yet by these organs alone could readily be divided into three distinct groups. In view therefore of this, combined with the differences in the nymphs and the adults, it has been thought best to raise Kirkaldy's subgenera to generic rank. And this leads us to believe that with similar studies in other groups, similar changes, one way or the other, will be forthcoming.

The above shows the value of such studies in determining generic differences. It has been found throughout the work that they are also of great value in specific determinations within the genus. So far we have not run across a single case where we could not find specific differences in the genitalia of the species of any genus. It is true, however, that in some genera, such as *Idiocerus*, these differences may be very slight, and further and careful study must be given to them before they could be used very much in separating the species. Even here, however, it has been found that they have some value, for such species as *Idiocerus verticis* and *nervatus* can readily be distinguished by the structure of the œdagus.

Furthermore, we believe these genitalia will help to settle questions as to the specific or varietal rank of certain forms. Illustrations of this were readily found among the *Typhlocybini* as well as among other groups. Thus it was found that *Erythroneura obliqua* had a constant form of internal genitalia. When its variety *fumida*, however, was examined, it was found that in no way could it possibly be considered as belonging to the same species, for the differences both of styles and œdagus could not possibly be as great in mere varieties of the same species. In the styles it was found that the terminal tooth of the latter was invariably much longer and more slender, while the œdagus of the latter was distinctly bifid apically as compared with the bluntly apexed œdagus of the former. Then when the variety *dorsalis* was examined, the style was found to be very different apically from that of the preceding two forms, while the œdagus had a pair of very large and conspicuous lateral processes of which in the two preceding forms there was not even a suggestion. It seemed clear enough then that the three forms examined must be distinct species.

With the thought in mind that such would also prove to be the case with the variety *nœvus*, we started in to study the latter form, but to our surprise, we found that in no appreciable way did it differ from typical *obliqua*, and as far as the genitalia showed was a true variety. And when one considers the color markings, it can readily be seen that this form is certainly far nearer typical *obliqua* than are either *fumida* or *dorsalis*. Accordingly we have decided to give the latter two specific rank, while retaining *nœvus* as a variety.

In the same way it was found that the variety *nigra* of *Erythroneura vulnerata* could no longer be considered as such because of the absolute difference in these organs, and so it too is raised to specific rank.

Erythroneura comes and its varieties also furnished interesting results. All the varieties were not at hand for study, but all available ones were studied with the result that varieties *scutelleris, basalaris,* and *maculata* are here given specific rank, while the other varieties studied, namely, *ziczac, vitis, infuscata,* and *coloradensis,* are retained as varieties. The former three have a type of genitalia, especially the œdagus, entirely different from that found in the rest of the *comes* group. The differences are very strong and obvious. They differ, however, very characteristically among themselves in the shape of the chitinous process in the dorsal margin of the pygofers. In *basalaris* this process is a simple rod tapering to an acute tip. In *maculata* this process terminates in two short and stout and widely separated teeth. In *scutelleris* it is of the same type as in *maculata,* but terminates in two long slender and approximate teeth. Thus they are readily separated from each other.

Moreover, when one studies the color markings of these forms, it will be seen that these three are more distant from *comes* than are the four which are retained as varieties. The variety *coloradensis* differs from typical *comes* only in the black spots of the scutellum. In *ziczac* the spots of *comes* have darkened and fused into the characteristic elytral lines and these are carried on to the pronotum and head in *infuscata.* And, as Gillette states, *ziczac* can readily be taken as an intermediate form between the typical *comes* and the variety *vitis.*

It should be mentioned here, however, that even in the case of these four varieties minor differences were observed and further study to ascertain the limits of variation in the genitalia of this group might make changes in the position in which we at this time leave these varieties. For the present though it seems best to leave them as varieties. The three which here are given specific rank are, however, very distinctly good species.

It should also be mentioned here that in the larger groupings there is more or less uniformity in the form of the genitalia. This is not true of all the groups. But in some cases, as for example in the *Typhlocybini*, we find the styles characteristic of the group.

Thus in the larger groups, the genera, the species, and in the varieties, we find in a study of these organs much that either confirms our present disposition of the members of this family, or else that shows us how to improve in our classification. All that this paper shows is simply the possibility along this line. As previously stated, the real value of such studies can only be shown when genera are treated in their entirety. This it is hoped will be done for many, if not all the groups, in the years to come.

Recognition of the Cicadellidæ.

It is not probable that the *Cicadellidæ* would be confused with any of the *Homoptera Sternorhynchi*, for in the latter, among the differences, the beak seemingly arises from between the prothoracic legs instead of the posterior portion of the head, the antennæ are of any form except setaceous as they are in the leaf hoppers, and the tarsi are composed of one or two segments, while in the leaf hoppers there are always three.

Of the *Homoptera Auchenorhynchi* the *Cicadidæ*, because of their much larger size, need never be confused with the leaf hoppers. The *Fulgoridæ* are also distinguished from them by having the variously formed antennæ situated directly below the eyes, instead of having the invariably setaceous antennæ between and below the eyes. The *Membracidæ* usually have the pronotum extending back over the abdomen, whereas that of the leaf hoppers does not. In the few tree hoppers where the pronotum does not extend back over the abdomen, we do not find the hind tibiæ provided with the double row of stout spines as in the leaf hoppers. The *Cercopidæ* are separated from the leaf hoppers by also lacking these spines, having instead one or two stout spines along the tibiæ and a circlet of small ones at the apex.

The following is a key for the separation of these families:

A. Large insects with three ocelli. *Cicadidæ.*
AA. Smaller insects with two or no ocelli.
  B. Pronotum usually prolonged backward over abdomen; hind tibiæ without double row of spines. *Membracidæ.*
  BB. Pronotum never prolonged backward over abdomen.
    C. Antennæ setaceous, between and below eyes.
      D. Hind tibiæ with distinct double rows of spines. *Cicadellidæ.*
      DD. Hind tibiæ with one or two stout spines and terminating in a circlet of small spines. *Cercopidæ.*
    CC. Antennæ of various forms but directly below the eyes. *Fulgoridæ.*

It will be seen from the above that the characteristically spined hind tibiæ alone are enough to distinguish the leaf hoppers from any of the other families. Indeed this is the outstanding feature of the family.

Systematic Treatment of Kansas Species.

Van Duzee in his catalogue of the *Hemiptera* of America north of Mexico, divides the *Cicadellidæ* into five subfamilies, which may be separated by the following key:

- A. Ocelli below margin of vertex.
  - B. With a distinct margin between the vertex and the front. *Paropinæ.*
  - BB. Without a distinct margin between the vertex and the front. *Bythoscopinæ.*
- AA. Ocelli, if present, on or above margin of vertex.
  - B. Ocelli on disc of vertex.
    - C. Body elongate, cylindrical. *Cicadellinæ.*
    - CC. Body more robust, flattened. *Gyponinæ.*
  - BB. Ocelli, if present, on or near the margin of vertex. *Jassinæ.*

The *Paropinæ* do not occur in the state, being found only west of the Rockies.

Subfamily BYTHOSCOPINÆ (Dohrn).

The members of this subfamily are in the main short and broad species, having the ocelli below the margin of the vertex on the front, and with no distinct margin between the vertex and the front.

KEY TO GENERA.

- A. Anterior margin of pronotum not distinctly produced beyond anterior margin of the eyes; vertex rounded anteriorly.
  - B. Head as wide as, or wider than, pronotum.
    - C. Elytra without a distinct appendix.
      - D. Pronotum finely granulated.
        - E. Posterior margin of vertex elevated, forming irregular curve. *Agalliopsis.*
        - EE. Posterior margin of vertex normal, forming regular curve. *Agallia.*
      - DD. Pronotum transversely and coarsely granulated. *Aceratagallia.*
    - CC. Elytra with distinct appendix. *Idiocerus.*
  - BB. Head narrower than pronotum. *Bythoscopus.*
- AA. Anterior margin of pronotum distinctly produced beyond anterior margin of the eyes; vertex obtusely angulate.
  - B. Striations of pronotum oblique. *Macropsis.*
  - BB. Striations of pronotum transverse. *Oncopsis.*

Genus AGALLIOPSIS Kirk.

This genus is distinguished from related genera by the characteristic elevated and irregularly curved posterior margin of the vertex. This condition results from a similarly formed vertex in the nymphs, in which, according to Osborn and Ball, "the entire posterior margin of the vertex is elevated and carried obliquely upward and forward before the eyes on the same plane as the face, the upper carinate margin being shallowly roundingly bilobed."

Only two species of this genus are found in the United States, one of which occurs in Kansas.

Agalliopsis novella (Say).

(Pl. 2, figs. 1-4.)

Jassus novellus Say, Jl. Acad. Nat. Sci. Phila., VI, p. 309, 1831.
Macropsis nobilis Forbes, 14th Rept. Ill. St. Ent., p. 22, 1884.
Agallia novellus Van D., Can. Ent., XXI, p. 8, 1889.
Idiocerus novellus Prov., Pet. Faune Ent. Can., III, p. 293, 1890.
Agallia novella Van D., Bul. Buf. Soc. Nat. Sci., V, p. 196, 1894.
Agallia novella O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 54, 1898.
Agallia novella DeL., Tenn. St. Bd. Ent., Bul. 17, p. 13, 1916.
Agallia novella Van D., Cat. Hemip. N. A., p. 571, 1917.
Agallia novella Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 20, 1919.

Form: The body outline forms almost a perfect wedge. It is comparatively more slender than the members of the genus *Agallia*. Length, about 3.75 mm. Vertex short, gradually lengthening toward eyes, with distinct lobe caudad of mesal margin of eyes. Pronotum twice as wide as long, anterior margin quite convex between lobes of vertex, posterior margin slightly concave within same limits, lateral margins obsolete, humeral margins long, longer than in *Agallia constricta*. Elytra very long, extending far beyond tip of abdomen.

Color: There is a considerable range of variation in the color. Some specimens, especially females, are often almost unicolorously light brown, barely showing the four black spots near the margin of the vertex. Others, usually males, have a much more variegated appearance, being dark brown, with lighter markings along the margin of the vertex, sides of the scutellum, the basal half and tip of the clavus. In such forms the four black spots of the vertex are very prominent, as is the median line of the pronotum with its dark black spot on either side.

External genitalia: Female, last ventral segment very long laterally but only about half as long medially, due to a deep circular excision; pygofers exceeded by the ovipositor. Male, valve about two-thirds as long as wide, truncate behind; plates long and scarcely tapering except near tip and forming the lid to a box formed by the very peculiar and very characteristic pygofers. The last-mentioned organs alone are enough to distinguish the males of this species.

Male internal genitalia: Styles composed of two unequal pieces, the larger ventrad of the smaller; connective inverted Y-shaped, with slender rounding arms and stem broadened to connect with œdagus; œdagus with wedge-shaped base, to end of which is fastened U-shaped structure consisting of a straight anterior arm and a curved posterior one. A pair of slender pointed stylets arise near base of the U and run caudad along either side of the curved arm of the U. In the side of each pygofer is imbedded a curved chitinous bar, the ends of which on emerging turn dorsad and end in a toothed, triangular, pointed style. At the base of the anal tube lies a well developed horseshoe, the tips of which end in upturned points in the pygofers.

Distribution: Cherokee, Riley, Douglas and Pottawatomie counties are the only ones in which this species has yet been taken. Presumably it occurs throughout the eastern portion of the State.

Hosts: The records show that grasses and weeds in woods or shaded places have yielded all our specimens.

Genus AGALLIA Curt.

This is group I of the genus *Agallia* of Osborn and Ball. It differs from the preceding genus in not having the elevated and irregularly curved posterior margin of the vertex, and from the following genus in that the pronotum is finely granulated instead of being coarsely punctured and transversely striated.

Just two species of this genus occur in Kansas. These may be distinguished by the following key.

KEY TO SPECIES.

A. Broader, stouter, male plates tapering regularly to acute tip, last ventral segment of female with posterior margin usually elevated. *4-punctata.*

AA. Narrower, more slender, male plates distinctly constricted near the middle, last ventral segment of female with posterior half distinctly depressed. *constricta.*

Agallia 4-punctata (Prov.).

(Pl. 2, figs. 5-6.)

Bythoscopus 4-punctata Prov., Nat. Can., IV, p. 376, 1872.
(*Agallia flacida* Uhl. MS) Van. D., Can. Ent., XXI, p. 9, 1889.
Agallia quadripunctata Van D., Ent. Am., V, p. 167, 1889.
Ulopa canadensis Van D., Trans. Am. Ent. Soc., XIX, p. 301, 1892.
Agallia 4-punctata G. & B., Hemip. Colo., p. 80, 1895.
Agallia 4-punctata O. & B., Proc. Dav. Acad. Sci., VII, p. 48, 1898.
Agallia 4-punctata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 12, 1916.
Agallia 4-punctata Van D., Cat. Hemip. N. A., p. 572, 1917.
Agallia 4-punctata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 21, 1919.

Form: This species is not only larger than the other species of the *Agallia* group found in the state, but it is also proportionately more robust, and hence is readily distinguished. Length, about 4 mm. Vertex short, of about same length throughout. Pronotum more than twice as broad as long, anterior margin broadly convex, posterior margin slightly concave, humeral margins rounding to eye. There is a very distinct bulge to the sides of the elytra that seems quite characteristic.

Color: Varies from yellowish brown to almost dark brown. Usually quite uniformly colored, except for the two dark spots on vertex and pronotum. Males and females colored alike. More uniform in color than the following species.

External genitalia: Female, last ventral segment three-fourths as long as wide, tapering through posterior third, hind margin usually elevated; pygofers broad, exceeded by ovipositor. Male, valve about twice as broad as long, slightly produced medially; plates broad at base, tapering evenly to acute tips. The straightness and evenness of the plates is characteristic. Pygofers shorter than plates and almost hidden by the latter.

Male internal genitalia: Styles club-shaped, terminating in two short lobes, the inner of which is sharply pointed; connective broad and well-developed, consisting of a short caudally directed portion and a long part directed cephalad to unite with the œdagus; œdagus consists of a broad T-shaped portion from the base of which arises a very long slender process extending caudad beyond the margin of the pygofers.

Distribution: Douglas, Riley, Labette and Pottawatomie counties have furnished the Kansas specimens hitherto collected. There are specimens from Kansas City, Mo., in the Snow collection. The range of this species would seem to be that of the preceding.

Hosts: Osborn and Ball give the following host plants: Horse-radish, beet, *Helianthus*, *Eupatorium*.

Agallia constricta Van D.

(Pl. 2, figs. 7-10.)

Agallia constricta Van D., Can. Ent., XXVI, p. 90, 1894.
Agallia constricta O. & B., Proc. Dav. Acad. Sci., VII, p. 52, 1898.
Agallia constricta DeL., Tenn. St. Bd. Ent., Bul. 17, p. 13, 1916.
Agallia constricta Van D., Cat. Hemip. N. A., p. 572, 1917.
Agallia constricta Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 19, 1919.

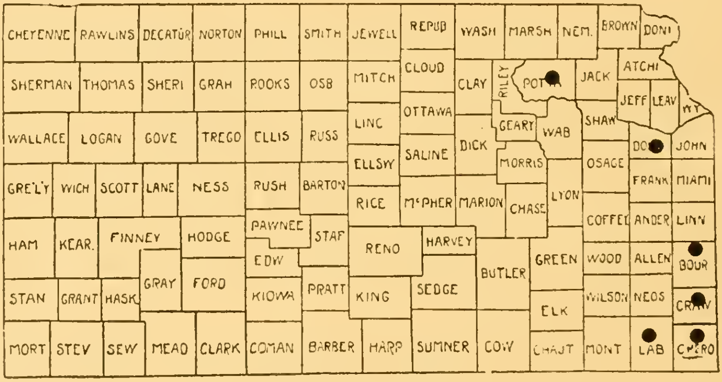
Form: A good deal like preceding species but somewhat smaller, not so robust, elytra longer and narrower. Length, 3.5 to 4 mm. Vertex slightly longer next the eyes than elsewhere, posterior margin slightly elevated; pronotum twice as wide as long, anterior margin strongly convex, posterior margin slightly concave, humeral margins distinctly developed at the expense of the practically obsolete lateral margins.

Color: Much the color of *4-punctata*. The type shows a pair of large black spots on vertex, and a pair on posterior half of pronotum. Vertex with a median brown line extending the length of the pronotum and almost entire length of scutellum. Posterior half of scutellum lighter colored than the rest of the quite uniformly colored body.

External genitalia: Female, last ventral segment about as long as wide, posterior half depressed on either side of a median carinate line, posterior margin obtusely rounded; pygofers wide and slightly exceeded by ovipositor. Male, valve twice as broad as long, margins parallel; plates long and narrow, constricted near middle, making these organs very characteristic; pygofers large, equalling or exceeding the plates.

Male internal genitalia: Styles of same type as in *4-punctata* only the processes here are much longer; connective T-shaped, not as wide as in *4-punctata*, and without the bend of the former; œdagus large, horn-shaped, with small dorsal process at base and bifid at tip.

Distribution: This species, like the preceding, seems to be found only in Eastern Kansas as shown by the following map:


CHEYENNE
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THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POT
JACK
ATCHI
OTTAWA
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
GEARY
WAB
SHAW
SALINE
DICK
DO
JOHN
ELLSW
MORRIS
OSAGE
GRE'L'Y
WICH
SCOTT
LANE
NESS
RUSH
BARTON
FRANK
MIAMI
RICE
M'PHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
PAWNEE
HAM
KEAR.
FINNEY
HODGE
STAF
RENO
HARVEY
GREEN
WOOD
ALLEN
BOUR
EDW
BUTLER
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
WILSON
NEOS
CRAW
ELK
MORT
STEV
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Our specimens were taken when sweeping grasses and weeds, on alfalfa, and at electric lights. It seems to be quite a general feeder occurring on a variety of food plants.

Genus ACERATAGALLIA Kirk.

This is the third group of Osborn and Ball. These forms are readily separated from the other members of the *Agallia* group by the coarsely punctured and transversely striated pronotum. There are no round black spots on the pronotum, which is either unicolorous or marked with dark bands.

The three members of this genus that occur in the State may be separated by the following key:

KEY TO SPECIES.

A. Spots on vertex large, usually dark, forms. *sanguinolenta.*
AA. Spots on vertex small, lighter forms.
  B. Elytra greatly exceeding tip of abdomen. *uhleri.*
  BB. Elytra scarcely exceeding tip of abdomen. *cinerea.*

Aceratagallia sanguinolenta (Prov.).

(Pl. 3, figs. 5-8.)

Bythoscopus sanguinolentus Prov., Nat. Can., IV, p. 376, 1872.
Bythoscopus siccifolius Uhl., Bul. U. S. Geol. Geog. Surv., I, p. 359, 1876.
Agallia siccifolius Van D., Can. Ent., XXI, p. 9, 1889.
Agallia sanguinolenta Van D., Ent. Am., V, p. 166, 1889.
Agallia sanguinolenta G. & B., Hemip. Colo., p. 81, 1895.
Agallia sanguinolenta O. & B., Proc. Dav. Acad. Sci., VII, p. 58, 1898.
Agallia sanguinolenta Gibs., U. S. Dept. Agr., Bur. Ent., Bul. 737, 1916.
Agallia sanguinolenta DeL., Tenn. St. Bd. Ent., Bul. 17, p. 14, 1916.
Agallia sanguinolenta Van D., Cat. Hemip. N. A., p. 573, 1917.
Agallia sanguinolenta Fent., Ohio Jl. Sci., XVIII, No. 6, p. 182, 1918.
Agallia sanguinolenta Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 22, 1919.

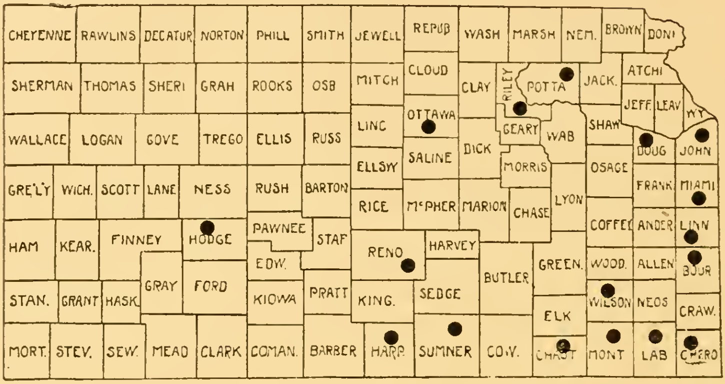
Form: A short, broad and quite flattened species. Length about 3 mm. Vertex longer than in preceding members of *Agallia* group and distinctly longer at middle than next to eyes. Pronotum twice wider than long, transversely striated, especially on posterior two-thirds, with anterior margin broadly rounded, posterior margin truncate or very slightly concave, lateral margins very short, humeral margins straight. Elytra broad, little longer than abdomen in female, considerably longer in some males.

Color: Light grey, with markings varying from very light to very dark. Vertex with two large black spots, broad median brown band and brown lines next the eyes. Face with suture, six or seven pairs of frontal arcs, and a median line on clypeus, brown. Pronotum with an interrupted arc of six brown dashes parallel with anterior margin, and with three longitudinal brown lines running caudad from the arc, the median band with a light band in its middle. Elytra with a mottled appearance, nervures brownish.

External genitalia: Female, last ventral segment over twice as wide as long, posterior margin sinuate, appearing to have two small lobes separated by a median notch; pygofers broad and exceeded by the ovipositor. Male, valve short, about six times as wide as long, truncate, lateral margins strongly narrowed posteriorly; plates broad, tapering to truncated tips, bases appearing constricted because enclosed by pygofers whose tips, thickly set with coarse hairs, slightly exceed tips of plates.

Male internal genitalia: Styles composed of cephalic club-shaped portion with the clubs bent mesad and a caudal flat part with the inner margin strongly serrate for its entire length and the latero-caudal corner drawn out into a long stout point, the points for attachment of connective very prominent; connective with broad, rounded base, slightly concave on anterior margin, and with well developed stem; œdagus short and stout, U-shaped, with arms short. Collar at base of anal tube V-shaped with sides strongly divergent and appearing to be composed of five segments.

Distribution: This species seems to be more widely distributed in the state than any other of the *Agallia* group. The records show it reaching further west than the others, as shown by the following map: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THOMAS
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RILEY
POTTA
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ATCHI
JEFF.
LEAV
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WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
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GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
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FRANK
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FINNEY
HODGE
PAWNEE
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COFFEE
ANDER
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WOOD.
ALLEN
BOUR
STAN.
GRANT
HASK.
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
BUTLER
WILSON
NEOS
CRAW.
ELK
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT
LAB
CHERO

Hosts: This is one of the species of economic importance feeding especially on members of the *Leguminosæ.* It is very common on alfalfa and clover but may be often found in large numbers on wheat, barley and rye, and also on wild grasses.

Aceratagallia uhleri (Van D.).

(Pl. 3, figs. 1-4.)

Agallia uhleri Van D., Can. Ent., XXVI, p. 91, 1894.
Agallia uhleri G. & B., Hemip. Colo., p. 81, 1895.
Agallia uhleri O. & B., Proc. Dav. Acad. Sci., VII, p. 59. 1898.
Agallia uhleri Van D., Cat. Hemip. N. A., p. 574, 1917.

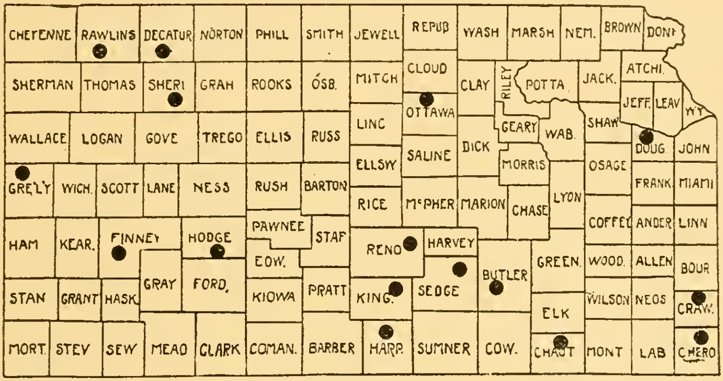
Form: Not as broad and flat as *sanguinolenta,* elytra much longer. Length, 3 to 3.25 mm. Vertex shorter than in *sanguinolenta,* very slightly longer medially than next to the eyes. Pronotum with anterior margin broadly rounded, posterior margin slightly concave, lateral margins long, reaching the eyes.

Color: The type shows the vertex bearing two black spots, smaller than in *sanguinolenta;* pronotum shows two small, brown spots closer together than spots of vertex, and about a fourth of the way back from the anterior margin; scutellum with two large, black, triangular, basal spots, the greater portion of which show up black through the pronotum; elytra light gray with darker nervures, thin, showing nervures of hind wings.

External genitalia: Female, last ventral segment broader than long, slightly narrowed posteriorly, posterior margin appearing bilobed because of large median incision which reaches nearly half the distance to the base; pygofers broad, slightly exceeded by ovipositor. Male, valve about five times as wide as long, lateral margins fusing with posterior margins to form a regular curve; plates short and stout, slightly tapering and cupping to very broad truncate tips, base enclosed by pygofers, which, slightly exceeding tip of plates, form a median keel.

Male internal genitalia: Styles of same type as in *sanguinolenta* but without latero-caudal corner drawn out; connective much as in *sanguinolenta* and yet differing in several details; œdagus with rather long arm for attachment to connective and two arms forming a very shallow V, the whole forming an irregular V with the base formed by the part attached to the connective.

Distribution: This species seems to have a state-wide distribution, as shown by the following map:



Hosts: Definite host plants seem to be unknown. It is generally taken sweeping the prairie grasses.

Aceratagallia cinerea (O. & B.).

(Pl. 2, figs. 11-13.)

Agallia cincerea O. & B., Proc. Dav. Acad. Sci., VII, p. 62, 1898.
Agallia sanguinolenta var. inconspicua Bak., Psyche, VIII, p. 198, 1898.
Agallia cinerea Ball, Psyche, IX, p. 128, 1900.
Agallia cinerea Van D., Trans. San Diego Soc. Nat. Hist., II, p. 52, 1914.
Agallia cinerea DeL., Tenn. St. Bd. Ent., Bul. 17, p. 14, 1916.
Agallia cinerea Van D., Cat. Hemip. N. A., p. 574, 1917.
Agallia cinerea Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 22, 1919.

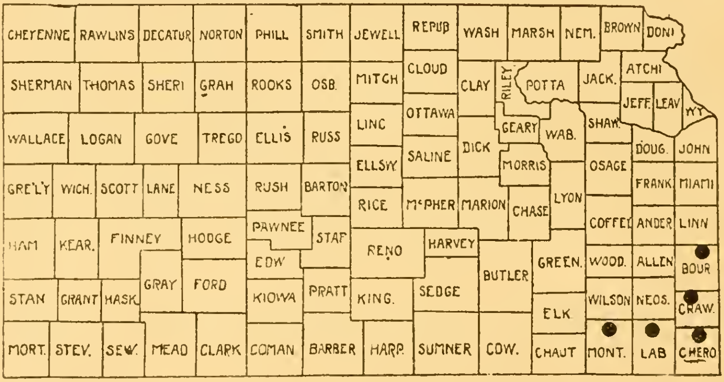
Form: Smaller than the other species of the *Agallia* group, broad and flattened. Vertex broad and as long as in any member of this group, distinctly longer at middle than next the eyes. Pronotum more than twice as wide as long, coarsely punctured, anterior margin broadly convex, posterior margin slightly concave, humeral margin long, reaching the eyes. Elytra a little longer than the abdomen.

Color: Generally uniformly light cinereous except for two small black spots on vertex. Much lighter than *uhleri*, being the lightest colored member of the *Agallia* group.

External genitalia: Female, last ventral segment a little less than three times as long as broad, posterior margin slightly sinuate and with a faint median notch; pygofers broad, barely exceeded by tip of ovipositor. Male, valve about five times as wide as long, the posterior, and lateral margins forming a regular curve; plates not as broad proportionately as in *uhleri*, tapering to somewhat truncate tips; pygofers enclosing base of plates and slightly exceeding them, meeting in a median ridge.

Male internal genitalia: Styles with broad basal club-shaped portion much as in two preceding species, but terminal half sinuate and terminal fourth broadly rounded and serrate medially, with caudo-lateral corner drawn out into strong point much as in *sanguinolenta.*

Distribution: So far this species has been taken only in the southeastern corner of the state, as shown by the following map: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LEAV
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WALLACE
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GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW.
SALINE
DICK
DOUG.
JOHN
GRE'L'Y
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
ELLSW.
MORRIS
OSAGE
FRANK
MIAMI
RICE
McPHER
MARION
CHASE
LYON
PAWNEE
STAF
COFFEE
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KEAR.
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HODGE
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RENO
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BUTLER
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GRANT
HASK.
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
ELK
WILSON
NEOS.
CRAW.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: The definite host is unknown, our specimens being taken when sweeping in pastures.

Genus Idiocerus Lewis.

This genus contains rather large wedge-shaped insects which taper gradually from the wide head backward. The vertex is short, the margins parallel. The male antennæ frequently end in flattened discs. The elytra are long and narrow, usually exceeding the abdomen, and have a very large appendix. All of our forms live in trees, chiefly willow, cottonwood, and *Cratægus.*

Eight species of this genus have been taken in the state, but four other species likely occur in our fauna and are therefore included in the key.

KEY TO SPECIES.*

A. Vertex with two round black spots.

B. Spots on vertex large, scarcely more than their own diameter from the eyes.

C. Without black spots on pronotum and scutellum.

D. Clavus unicolorous. *fitchi.*

DD. Basal half of clavus bright yellow. *provancheri.*

CC. With black spots on pronotum and scutellum. *cratægi.*

BB. Spots on vertex small, two or more times their own diameter from the eyes.

C. Nervures of elytra not distinctly alternating in color; outer anteapical cell, if present, triangular.

D. Green forms, dark line along sutural margin of elytra. *snowi.*

DD. Brown forms, without dark lines on sutural margin of elytra. *ramentosus.*

CC. Nervures of elytra usually alternately light and dark, outer anteapical cell long and narrow.

D. Cross nervure between first and second sectors broadly white. *moniliferæ.*

DD. Cross nervure between first and second sectors not broadly white.

E. Species larger, 5 mm. or over, darker; male antennæ with moderate discs on longer filaments. *alternatus.*

EE. Species smaller, 4.5 mm. or less, lighter; male antennæ with very large discs on very short filaments. *verticis.*

AA. Vertex without round black spots.

B. With dark band on sutural margin of elytra. *suturalis.*

BB. Without dark band on sutural margin of elytra.

C. Size large, over 5 mm. long.

D. Outer anteapical cell present, male antennal discs large. *pallidus.*

DD. Outer anteapical cell absent, male antennal discs very small. *duzeei.*

CC. Size smaller, less than 5 mm. long, elytra hyaline, showing dark nervures of the wings. *nervatus.*

Idiocerus fitchi Van D.

Idiocerus fitchi Van D., Can. Ent., xli, p. 383, 1909 (n. n. for maculipennis Fh.).
Idiocerus maculipennis Fh., Homop. N. Y. St. Cab., p. 59, 1851.
Bythoscopus maculipennis Walk., List Homop., IV., p. 1161, 1852.
Idiocerus maculipennis Van D., Psyche, V, p. 388, 1890.
Idiocerus maculipennis O. & B., Proc. Dav. Acad. Sci., VII, pp. 73, 127, 1898.
Idiocerus maculipennis Osb., 20th Rept. N. Y. St. Ent., p. 507, 1905.
Idiocerus fitchi Britt. & Saund., Can. Ent., xlix, p. 149, pl. IX, 1917.
Idiocerus maculipennis Van D., Cat. Hemip. N. A., p. 580, 1917.
Idiocerus maculipennis Nic., Ent. News, XXX, p. 277, 1919.

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* Adapted from Osborn and Ball, Proc. Dav. Acad. Sci., VII, p. 125, 1898.

This species has not yet been reported from the state, but likely occurs here. It is a chestnut brown species with two large, black spots on the vertex, the costal margin of the distal half of the wings has two large, dark-brown spots which are separated by a large hyaline band. Length, 5.25 to 5.75 mm. Ball records it as abundant on hawthorn and crabapple.

Idiocerus provancheri Van D.

Idiocerus provancheri Van D., Can. Ent., xxiii, p. 111, 1890. (n. n. for clitellarius Prov.)

Bythoscopus clitellarius Prov., Pet. Faune Ent. Can., iii, p. 288, 1890.

Idiocerus provancheri Osb., Proc. Ia. Acad. Sci., I, pt. 2, p. 126, 1892.

Idiocerus provancheri O. & B., Proc. Dav. Acad. Sci., VII, p. 127, 1898.

Idiocerus provancheri Osb., Me. Agr. Exp. Sta., Bul. 238, p. 77, 1916.

Idiocerus provancheri Van D., Cat. Hemip. N. A., p. 580, 1917.

This is another of the forms which, though not yet reported from Kansas, likely occur here. The females are fulvous brown, the males darker, but both are readily recognized by having broad, yellow stripes on the base of the clavus. Length, 5 to 5.3 mm. Occurs on *Cratægus*.

Idiocerus cratægi Van D.

Idiocerus cratægi Van D., Can. Ent., XXII, p. 110, 1890.

Idiocerus cratægi O. & B., Proc. Dav. Acad. Sci., VII, p. 128, 1898.

Idiocerus cratægi Osb., 20th Rept. N. Y. St. Ent., p. 507, 1905.

Idiocerus cratægi Van D., Cat. Hemip. N. A., p. 580, 1917.

This species will likely be found in the state sooner or later, though it has not yet been taken here. It is slightly smaller than the preceding species, olive drab in color, and at once recognized by the two rows of black spots on the vertex, prothorax and scutellum. Length, 4.75 to 5.25 mm. Feeds on *Cratægus*

Idiocerus snowi G. & B.

(Pl. 3, figs. 9-11.)

Idiocerus snowi G. & B., Hemip. Colo., p. 79, 1895.

Idiocerus snowi O. & B., Proc. Dav. Acad. Sci., VII, p. 129, 1898.

Idiocerus snowi Van D., Cat. Hemip. N. A., p. 579, 1917.

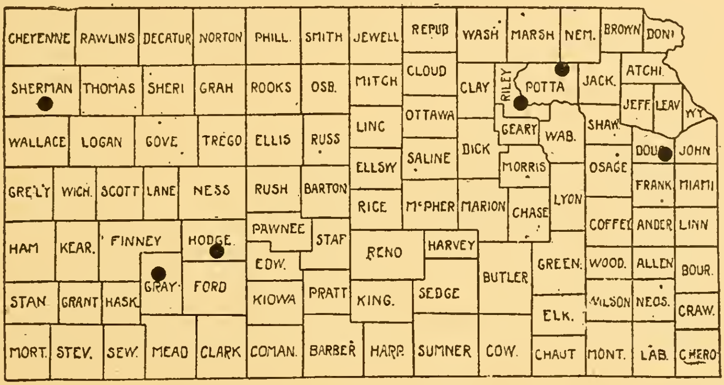
Form: Larger and usually more slender than preceding species. Length, 5.25 to 5.75 mm.

Color: Pale green except for two small, black spots on vertex, a dark band on sutural margin of elytra from tip of scutellum to tip of clavus. Elytra hyaline and with tips often somewhat dusky or brownish.

External genitalia: Female, last ventral segment less than three times as wide as long, lateral margins short, broadly curving with posterior margin to point of greatest length of the segment on either side of the broad but shallow median notch. Pygofers large, but exceeded by the ovipositor for more than a third of their length. Male, last ventral segment short except on median line, posterior margin sinuate with a large, obtusely pointed, median tooth; plates rather slender, somewhat exceeding the pygofers.

Male internal genitalia: Styles large, basal portion slender and straighter, distal portion stout and broadly curved; connective broad, corners attached to styles prominent, bearing a large ventral process, slightly concave at the end where it attaches to the œdagus; œdagus composed of a dorsal shorter heavy process for attachment, and a longer ventral process terminating in a sharp point, and bearing, at about its distal third, a pair of diverging anteriorly directed processes, giving this process an arrow-head appearance. Around the base of the anal tube is a heavy-set U-shaped collar with the arms of the U slightly diverging.

Distribution: This species likely occurs throughout the state, for specimens have been taken in the extreme western and eastern portions, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL.
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI.
JEFF.
LEAV
WY.
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW.
DOU
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
FRANK.
MIAMI
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
HAM
KEAR.
FINNEY
HODGE.
PAWNEE
STAF
EDW.
RENO
HARVEY
COFFE
ANDER
LINN
GREEN.
WOOD.
ALLEN
BOUR.
BUTLER
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS.
CRAW.
ELK.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB.
CHERO

Idiocerus ramentosus (Uhl.).

Bythoscopus ramentosus Uhl., Bul. U. S. Geol. Geog. Surv., III, p. 465. 1877.
(*Idiocerus inscriptus* Uhl. MS.) in collections.
Idiocerus ramentosus Van D., Psyche, V, p. 389, 1890.
Idiocerus verticis Prov., Pet. Faune Ent. Can., III, p. 292, 1890.
Idiocerus mimicus G. & B., Hemip. Colo., p. 76, 1895.
Idiocerus ramentosus G. & B., Hemip. Colo., p. 79, 1895.
Idiocerus brunneus O. & B., Proc. Dav. Acad. Sci., VII, pp. 72, 129, 1898.
Idiocerus ramentosus O. & B., Proc. Dav. Acad. Sci., VII, p. 137, 1898.
Idiocerus ramentosus Gibs., Can. Ent., XLIX, p. 75, 1917.
Idiocerus ramentosus Van D., Cat. Hemip. N. A., p. 579, 1917.

This is another species which though not yet reported, will likely be found in Kansas.

It is a rather broad form, of a cinnamon-brown color, and having two small, black spots on the vertex. Length, 5.5 mm. It is a willow-feeding species.

Idiocerus moniliferæ O. &. B.

Idiocerus moniliferæ O. & B., Proc. Dav. Acad. Sci., VII, pp. 71, 131, 1898.
Idiocerus moniliferæ Tuck., Kan. Univ. Sci. Bul., IV, p. 65, 1907.
Idiocerus moniliferæ Van D., Cat. Hemip. N. A., p. 578, 1917.

Form: Rather broad and somewhat flattened. Length, 5.5 mm.

Color: Brownish species. Vertex and pronotum rather irregularly marked with dark-brown, scutellum with large, dark, triangular basal marks, and light-brown median band between the two, and two similar light-brown bands on posterior portion. Face with dark band above ocelli, and other irregular markings. Elytra hyaline, with nervures alternately light and dark, and differing from *alternatus* and *verticis* by having the cross nervure between the sectors broadly white.

External genitalia: Female, last ventral segment medially produced posteriorly and slightly notched; pygofers broad and long, only slightly exceeded by tip of ovipositor. Male, last ventral segment with very short lateral margins, posterior margin greatly produced posteriorly, forming a very large obtusely-pointed median projection; plates short and stout, exceeded by tips of pygofers; antennæ without discs.

Distribution: Douglas, Riley, and Wallace counties are the only ones in which specimens have been taken.

Host: Cottonwood.

Idiocerus alternatus Fh.

Idiocerus alternatus Fh., Homop. N. Y. St. Cab., p. 59, 1851
Bythoscopus alternatus Walk., List Homop., III, p. 876, 1851.
Idiocerus interruptus G. & B., Hemip. Colo., p. 74, 1895.
Idiocerus alternatus O. & B., Proc. Dav. Acad. Sci., VII, pp. 70, 131, 1898.
Idiocerus alternatus Osb., 20th Rept. N. Y. St. Ent., p. 506, 1905.
Idiocerus alternatus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 93, 1915.
Idiocerus alternatus DeL. Tenn. St. Bd. Ent., Bul. 17, p. 10, 1916.
Idiocerus alternatus Van D., Cat. Hemip. N. A., p. 577, 1917.
Idiocerus alternatus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 18, 1919.

Form: Smaller and not as robust as preceding species. Length, 5 to 5.25 mm.

Color: Brownish species, much as in preceding species. Vertex with two small, black spots. Broad median white band on pronotum and extending on to vertex. Elytra with nervures alternately light and dark, a distinct broad light band across the tips of the outer claval nervures and a smaller one at the tip of the clavus; cross nervure between the sectors dark.

External genitalia: Female, last ventral segment short, posterior margins truncate or slightly sinuate, with faint median notch, lateral margins strongly narrowed posteriorly; pygofers broad and long, but exceeded by the ovipositor for a third their length. Male, ventral segment very short except for two large lateral lobes which are separated by a wide and deep median incision in which is a very small median lobe; plates, slightly exceeded by the long pygofers; antennal discs nearly circular.

Distribution: So far, we have records of the collection of this species from four northern counties, namely: Douglas, Riley, Decatur and Rawlins.

Hosts: Willows.

Idiocerus verticis (Say).

(Pl. 4, figs. 4-6.)

Jassus verticis Say, Jl. Acad. Nat. Sci. Phila., VI, p. 308, 1831; Compl. Writ., ii, p. 383.

Bythoscopus verticis Uhl., Bul. U S. Geol. Geog. Surv., iii, p. 465, 1877.

Idiocerus verticis Van D., Psyche, v, p. 389, 1890.

Idiocerus verticis G. & B., Hemip. Colo., p. 80, 1895.

Idiocerus verticis O. & B., Proc. Dav. Acad. Sci., vii, p. 132, 1898.

Idiocerus verticis Osb., 20th Rept. N. Y. St. Ent., p. 507, 1905.

Idiocerus verticis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 11, 1916.

Idiocerus verticis Van D., Cat. Hemip. N. A., p. 577, 1917.

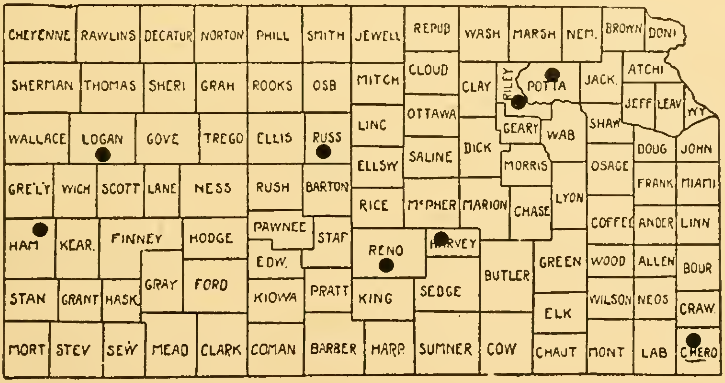
Form: The smallest member of the genus in Kansas. Length, 4.25 to 4.5 mm.

Color: Pale brownish to nearly white. Pair of small, black spots on vertex. Pronotum with light-brown markings on disc. Scutellum with basal angles black or brown. Brown nervures of elytra usually interrupted with white, dark specimens showing light spot across middle of clavus.

External genitalia: Female, last ventral segment much as in *alternatus*, short, posterior margin usually slightly sinuate on either side of the slightly produced and faintly notched median portion, lateral margins strongly narrowed posteriorly; pygofers exceeded by the ovipositor by about one-third their length. Male, last ventral segment as in *alternatus*, with long lateral lobes, large median incision with small median lobe, median incision sometimes not as deep as in *alternatus;* plates, long and slender, equalling the long pygofers; antennæ very short and with very large discs.

Male internal genitalia: Styles smaller than in *snowi*, basal part more slender; connective with three basal processes, as in *snowi*, but upper portion narrow, only half as wide; œdagus Y-shaped, with distinct base and slender upper arm, lower arm simple, without the arrowhead appearance as in *snowi;* collar around base of anal tube slender and open slightly at tip, forming almost a complete circle.

Distribution: A species seemingly occurring over the state, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DICK
DOUG
JOHN
ELLSW
SALINE
MORRIS
OSAGE
GRE'L'Y
WICH
SCOTT
LANE
NESS
RUSH
BARTON
FRANK
MIAMI
LYON
RICE
McPHER
MARION
CHASE
COFFEE
ANDER
LINN
PAWNEE
STAF
HAM
KEAR.
FINNEY
HODGE
HARVEY
RENO
EDW.
GREEN
WOOD
ALLEN
BOUR
BUTLER
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
WILSON
NEOS
CRAW
ELK
MORT
STEV
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Willows.

Idiocerus suturalis Fh.

Idiocerus suturalis Fh., Homop. N. Y. St. Cab., p. 59, 1851.
Bythoscopus suturalis Walk., List. Homop., iv, p. 1162, 1852.
Idiocerus suturalis Van D., Can Ent, xxi, p. 8, 1899.
Idiocerus suturalis Van D., Psyche, v, p. 388, 1890.
Idiocerus suturalis G. & B., Hemip. Colo., p. 80, 1895.
Idiocerus suturalis O. & B., Proc. Dav. Acad. Sci., vii, p. 134, 1898.
Idiocerus suturalis Ball, Can. Ent., xxxiv, p. 311, 1902.
Idiocerus suturalis Osb., 20th Rept. N. Y. St. Ent., p. 506, 1905.
Idiocerus suturalis Osb., Me. Agr. Exp. Sta., Bul. 238, p. 95, 1915.
Idiocerus suturalis Van D., Cat. Hemip. N. A., p. 576, 1917.

Form: Larger than preceding species. Length, 5 to 5.75 mm.

Color: Light yellow, with pronotum and scutellum frequently marked in places with light brown, the basal angles of the latter sometimes with black triangles; elytra with sutural margins broadly marked with brown band which narrows to tip of clavus and then expands on membrane into a smoky area.

External genitalia: Female, last ventral segment with lateral margins about half as long as median length, due to a broad median lobe; pygofers broad and long, exceeded by ovipositor by about one-fifth their length. Male, last ventral segment very narrow, median incision broad and with a broad, short, triangular process; plates long and narrow, exceeding the short pygofers.

Distribution: Hitherto taken only in Douglas and Logan counties.

Hosts: Willows seem to be the ordinary host. Van Duzee reports taking specimens from poplar and birch, also.

Idiocerus pallidus Fh.

(Pl. 4, figs. 1-3.)

Idiocerus pallidus Fh., Homop. N. Y. St. Cab., p. 59, 1851.
Bythoscopus obsoletus Walk., List. Homop., iii, p. 873, 1851.
Bythoscopus pallidus Walk., List Homop., iv, p. 1162. 1852.
Idiocerus pallidus Van D., Can. Ent., xxi, p. 8, 1889.
Idiocerus unicolor Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Idiocerus pallidus G. & B., Hemip. Colo., p. 76, 1895.
Idiocerus pallidus O. & B., Proc. Dav. Acad. Sci., vii, p. 135, 1898.
Idiocerus pallidus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 93, 1915.
Idiocerus pallidus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 11, 1916.
Idiocerus pallidus Gibs., Can. Ent., xlix, p. 75, 1917.
Idiocerus pallidus Van D., Cat. Hemip. N. A., p. 575, 1917.
Idiocerus pallidus Fent., Ohio Jl. Sci., xviii, No. 6, p. 182, 1918.

Form: This and the following species are the largest members of this genus known to occur in the state. Broad. Length, 6 to 6.5 mm. Distinguished from *duzeei* by usually having long, triangular, outer anteapical cell.

Color: Our specimens are almost uniformly pale green with the eyes reddish-brown. Elytra are frequently iridescent but not fuscous-tipped as in *duzeei*.

External genitalia: Female, last ventral segment about one-fourth as long as wide laterally, but nearly one-half as long as wide medially, due to large rounded median lobe on posterior margin; pygofers exceeded by ovipositor for about one-third their length. Male, last ventral segment narrow, the tip of triangle, in the wide median incision, reaching posteriorly to point in line with lateral lobes; plates very long and narrow, frequently greatly exceeding the short pygofers.

Internal male genitalia: Styles large with basal portion much larger proportionally than in *verticis;* connective of same type as in *verticis* but with dorsal portion wider, though not as wide as in *snowi,* and with end fastened to œdagus much more deeply emarginated than in the latter; œdagus without basal portion as in *verticis,* dorsal arm very heavy and with heavy ventral portion provided with retrorse lateral processes which, however, are nearer the apex than in *snowi,* giving the arrowhead appearance; antennæ with moderately large oblong discs.

Distribution: Taken in Harvey, Harper, Riley, Pottawatomie, and Wyandotte counties.

Hosts: Willows. Doctor Osborn gives poplar as a host, too. Crevecœur records sweeping specimens from weeds in a pasture.

Idiocerus duzeei Prov.

Idiocerus duzeei Prov., Pet. Faune Ent. Can., iii, p. 292, 1890.
Idiocerus perplexus G. & B., Hemip. Colo., p. 78, 1895.
Idiocerus perplexus Bak., Ent. News, viii, p. 54, 1897.
Idiocerus duzeei O. & B., Proc. Dav. Acad. Sci., vii, p. 136, 1898.
Idiocerus duzeei Bak., Can. Ent.. xxxii, p. 207, 1900.
Idiocerus perplexus Tuck, Univ. Kan. Sci. Bul., iv, p. 65, 1907.
Idiocerus perplexus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 95, 1915.
Idiocerus perplexus Van D., Cat. Hemip. N. A., p. 577, 1917.

Form: Slightly larger than *pallidus.* Elytra longer, broad, rarely having outer anteapical cell. Length, 6 to 7 mm.

Color: Yellowish-green, pronotum greenish, scutellum and elytra golden-yellow, latter becoming smoky at tip in female and darker still in male.

External genitalia: Female, last ventral segment longer laterally than in *pallidus,* and therefore having a less prominent lobe medially on the posterior margin; pygofers broad and long, slightly exceeded by ovipositor. Male, last ventral segment much as in *pallidus* but with median triangular lobe not quite as long; valves long and narrow, greatly exceeding the short pygofers; antennal disc more slender than in *pallidus.*

Distribution: Taken only in Pottawatomie and Riley counties.

Hosts: Osborn and Ball give cottonwood as the host of this species.

Idiocerus nervatus Van D.

(Pl. 4, figs. 7-9.)

Idiocerus nervatus Van D., Bul. Buf. Soc. Nat. Sci., v, pp. 194, 205, 1894.
Idiocerus nervatus G. & B., Hemip. Colo., p. 76, 1895.
Idiocerus nervatus O. & B., Proc. Dav. Acad. Nat. Sci., vii, p. 137, 1898.
Idiocerus nervatus Osb., 20th Rept. N. Y. St. Ent., p. 506, 1905.
Idiocerus nervatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 11, 1916.
Idiocerus nervatus Van D., Cat. Hemip. N. A., p. 575, 1917.
Idiocerus nervatus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 18, 1919.

Form: Next to *verticis* the smallest member of the genus found in the state. A small, stout species with long elytra. Length, 4.5 to 4.75 mm.

Color: Quite uniformly greenish to yellowish in color. Elytra quite hyaline, showing clearly the dark nervures of the under wings.

External genitalia: Female, last ventral segment little over twice as broad as long, lateral margins rounding, posterior margins truncate or slightly sinuate to two very small median lobes, separated by suggestion of a median notch; ovipositor exceeding pygofers by nearly one-third their length. Male, last ventral segment short, very wide median excision bearing distinct, acutely pointed lobe; valves long and narrow, but not exceeding the long pygofers; male antennal disc small and nearly circular.

Internal male genitalia: Styles with very small basal portion, even smaller than in *verticis;* connective of same type as in *verticis* except that dorsal portion is more slender; œdagus like that of *verticis* except for the small pair of retrorse processes near the tip.

Distribution: Taken in Crawford, Douglas, Riley and Ottawa counties.

Hosts: Willows.

Genus BYTHOSCOPUS Germ.

To this genus belong short, stout species, with the head narrower than the prothorax, the anterior margin of which is not produced beyond the anterior margin of the eyes. The vertex is short, often with the margins nearly parallel, but frequently much longer on the median line than next the eyes. The pronotum is large, with very distinct, parallel, transverse striations. The elytra are subcoriaceous, short, deeply punctured, and with the punctures bearing short hairs.

Only one species of this genus has been recorded from Kansas, but it is probable that the following two occur.

KEY TO SPECIES.

A.	Size 5.75 mm. or over, more slender forms.	*lætus.*
AA.	Size 5 mm. or less, short, broad forms.	*apicalis.*

Bythoscopus lætus (Uhl.).

Pachyopsis lætus Uhl, Bul. Geol. Geog. Surv., iii, p. 466, 1877.
Macropsis lætus Ball, Ohio Nat., iii, p. 397, 1903.
Bythoscopus lætus Van D., Cat. Hemip. N. A., p. 589, 1917.

This large green species has not yet been taken in Kansas. Its host plant, *Rhus aromatica*, occurs here as well as on the plains of Colorado, where it has been taken. Its pink variety, *pætus* Ball, reported by Ball to occur on the fruit clusters of the plant, should also be found here. Length, 5.75 to 7 mm.

Bythoscopus apicalis (O. & B.).

Pl. 5, figs. 1-4.)

Macropsis apicalis O. & B., Proc. Dav. Acad. Sci., vii, p. 64, 1898.
Macropsis alabamensis Bak., Psyche, ix, p. 58, 1900.
Macropsis apicalis Ball, Psyche, ix, p. 129, 1900.
Macropsis apicalis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 9, 1916.
Bythoscopus apicalis Van D., Cat. Hemip. N. A., p. 589, 1917.

Form: Short and broad. Vertex very short and narrow. Pronotum distinctly striated transversely, much broader than head, lateral margins long and widening posteriorly, humeral margins about as long as lateral margins, posterior margin broadly and slightly concave. Elytra appearing broad and short but exceeding abdomen, appendix large and glabrous, but rest of elytra deeply punctate with each puncture bearing a prominent hair.

Color: Uniformly bright green, except for small black spots on apex of elytra.

External genitalia: Female, last ventral segment a little over twice as long as broad, posterior angles prominent, with posterior margin sinuate to slightly produced broad median lobes which have a shallow notch between them; pygofers long, barely exceeded by tip of ovipositor or equalling or even exceeding ovipositor. Male, valve very large, prominently elevated on median line, as long as broad, posterior margin broadly convex.

Male internal genitalia: The plates are completely covered by the valve and are therefore here described with the internal organs. They are over twice as long as wide, having the outer anterior angle produced to connect with the styles and also having the inner posterior angles greatly produced and pointed, outer posterior angle large and broadly rounded, making the plate the broadest at this point. They are peculiar also in their position, standing almost vertically instead of being in the ordinary horizontal position. Styles are long and slender and somewhat curved, arising from the top or really the anterior end of the plates. The connective here seems to be composed of a U-shaped piece attached to the top of the plates. This piece has a small anterior lobe to which are fastened a pair of long chitinous organs, widest near the middle, and tapering to ends, one anteriorly curved and the other posteriorly. These organs look much like styles but judging from their vertical position and their relation to the other parts, I would conclude they are parts of a very characteristic connective rather than a second pair of styles. To a point near the middle of these latter organs is fastened the œdagus, consisting of a large, triangular dorsal piece, when viewed laterally, from the base of which there extends caudad the lower portion of the œdagus, which consists of two slender processes very much shorter than the styles. In the sides of the pygofers are imbedded two long chitinous organs as illustrated.

Distribution: Douglas county is the only place within the state where this species has been taken. There are specimens in the Snow collection from Kansas City, Mo. It should occur wherever its host is found.

Hosts: Seemingly confined to honey locust.

Genus MACROPSIS Lewis.

In this genus the vertex forms only a narrow margin to the pronotum, the head being almost entirely deflexed. It is as wide as the short and broad pronotum, the anterior margin of which is distinctly produced beyond the anterior margin of the eyes. The lateral margins of the pronotum are short, the posterior margin broadly or angularly concave, and its surface is distinctly and obliquely striated. The scutellum is broadly triangular and with a transverse depression before the apex. Elytra are thin and rather long.

Seven species of this genus likely occur in Kansas, five of which have been taken here. These may be separated by the following key:

KEY TO SPECIES *

- A. General color above fuscous or rusty brown.
  - B. Face marked with fuscous. *tristis.*
  - BB. Face unicolorous. *trimaculata.*
- AA. General color, orange or green.
  - B. Elytra brownish or with dark brown median stripe.
    - C. Pronotum green, elytra with broad median band. *suturalis.*
    - CC. Pronotum yellow, elytra brownish. *crocea.*
  - BB. Elytra greenish or slightly fuscous in male.
    - C. Larger species, vertex pointed, propleuræ of both sexes marked with black spots. *erythrocephala.*
    - CC. Smaller species, vertex more obtusely angled, propleuræ of female unmarked.
      - D. Females 5 to 6 mm. long, males with spots on propleuræ. *viridis.*
      - DD. Females less than 5 mm. long, males with propleuræ unmarked. *gleditschiæ.*

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* Adapted from Osborn & Ball, Proc. Dav. Acad. Sci., vii, p. 114, 1898.

Macropsis tristis (Van D.).

Pediopsis tristis Van D., Can. Ent., xxii, p. 249, 1890.
Pediopsis tristis Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Pediopsis tristis O. & B., Proc. Dav. Acad. Sci., vii, pp. 66, 115, 1898.
Pediopsis tristis Ball, Ohio Nat., iii, p. 398, 1903.
Macropsis tristis Van D., Cat. Hemip. N. A., p. 585, 1917.

This species very likely occurs in Kansas. It is a grayish-brown form with face marked with a black band above and large spot below the ocelli. Striations of pronotum very distinct. Scutellum with dark triangular spots on basal angles. Elytra with light nervures, heavily fuscous-margined, making them very distinct and characteristic. Length, 4.75 to 5.5 mm.

Hosts: Dr. Ball gives wild plum as the host of this form.

Macropsis trimaculata (Fh.).

Pediopsis trimaculatus Fh., Homop. N. Y. St. Cab., p. 60, 1851.
Bythoscopus trimaculatus Walk., List Homop., iv, p. 1162, 1852.
Pediopsis insignis Van D., Ent. Am., v, p. 171, 1889.
Pediopsis insignis Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Pediopsis trimaculata O. & B., Proc. Dav. Acad. Sci., vii, p. 116, 1898.
Pediopsis trimaculata Ball, Ohio Nat., iii, p. 398, 1903.
Pediopsis trimaculata Osb., 20th Rept. N. Y. St. Ent., p. 504, 1905.
Pediopsis trimaculata Van D., Can. Ent., xli, p. 383, 1909.
Pediopsis trimaculata Osb., Me. Agr. Exp. Sta., Bul. 238, p. 91, 1915.
Macropsis trimaculata Van D., Cat. Hemip. N. A., p. 584, 1917.

Form: Smaller than preceding species. Length, 4 to 4.5 mm. Vertex and pronotum obtusely angled, latter distinctly striated and with posterior margin broadly and rather deeply concave.

Color: Yellowish-brown to dark brown, face unicolorous. Scutellum with triangular dark spot in each basal angle. Elytra with three white spots in a row on each elytron, the anterior one frequently wanting. Propleura with dark spot in both sexes. Differs from *tristis* in having face unmarked.

External genitalia: Female, last ventral segment about twice as broad as long, lateral margins greatly narrowed posteriorly, reducing posterior margin to less than one-half width of anterior margin, posterior margin broadly incised between the distinct lateral angles; pygofers long and narrow, exceeded by the ovipositor. Male, last ventral segment about twice as broad as long, posterior margin slightly emarginate medially; plates long and narrow, somewhat flattened, much exceeding the pygofers; broad and short, widest near the tip and ending truncately.

Distribution: Pottawatomie county is the only place in the state where this species has yet been taken.

Hosts: Occurs with the preceding form on wild plum.

Macropsis suturalis (O. & B.).

Pediopsis suturalis O. & B., Proc. Dav. Acad. Sci., vii, pp. 67, 119, 1898.
Pediopsis suturalis Wirtn., Ann. Carn. Mus., iii, p. 217, 1904.
Pediopsis suturalis Osb., Me. Agr. Exp. Sta., Bul. 238, p. 92, 1915.
Macropsis suturalis Van D., Cat. Hemip. N. A., p. 583, 1917.

Form: A large species. Length, 6 mm. Vertex and pronotum obtusely angled, the latter with the striations not as distinct as in preceding species. Elytra long and slender.

Color: Green all over except for dark brown lines starting on pronotum behind the eyes, including all the clavus, extending beyond clavus at about their distal half and continuing, as a narrow stripe, to tip of elytra.

External genitalia: Female, last ventral segment as in *trimaculata* but proportionately larger; pygofers very long and narrow, slightly exceeded by tip of ovipositor. Male, last ventral segment broad, slightly emarginate posteriorly; plates long and narrow, much exceeding the short but broad pygofers.

Distribution: Taken in Ottawa and Pottawatomie counties.

Hosts: Occurs in both counties on *Salix amygdaloides.*

Macropsis crocea (O. & B.).

Pediopsis crocea O. & B., Proc. Dav. Acad. Sci., vii, pp. 68, 120, 1898.
Macropsis crocea Van D., Cat. Hemip. N. A., p. 583, 1917.

Form: Stout. Length, 4 to 5.5 mm. Vertex and pronotum obtusely angled. Pronotum coarsely striated, posterior margin deeply concave, almost parallel with anterior margin. Elytra long and usually somewhat spread apart at tip.

Color: Yellow, but with elytra, especially clavus, clouded with brown.

External genitalia: Female, last ventral segment characteristic of the genus; pygofers long and narrow, exceeded by ovipositor. Male, last ventral segment over twice as broad as long; valve appearing to be short and triangular; plates long, narrow and flattened, exceeding the short, broad and truncate pygofers.

Distribution: This form has not yet been reported from Kansas.

Hosts: The types were taken on honey locust.

Macropsis erythrocephala (G. & B.).

Pediopsis erythrocephala G. & B., Hemip. Colo., p. 72, 1895.
Pediopsis erythrocephala O. & B., Proc. Dav. Acad. Sci., vii, p. 120, 1898.
Pediopsis erythrocephala Ball, Ohio Nat., iii, p. 398, 1903.
Pediopsis erythrocephala Tuck., Kans. Univ. Sci. Bul., iv, p. 65, 1907.
Macropsis erythrocephalus Van D., Cat. Hemip. N. A., p. 583, 1917.

Form: A large, stout species, larger than other green species of this genus. Length, 5 to 5.75 mm. Vertex and pronotum more acutely pointed than in most members of the genus. Striations of pronotum distinct, but rather fine.

Color: Green, varying to reddish-orange on face, pronotum, and scutellum of female. Male, greenish brown, with dark-brown spots laterally near anterior margin of pronotum and on basal angles of the scutellum. Propleuræ with large black spots in both sexes.

Genitalia: Characteristic of the genus.

Distribution: Gray and Pottawatomie counties have so far yielded specimens of this species.

Hosts: Salix fluviatilis seems to be the willow on which it occurs.

Macropsis viridis (Fh.).

(Pl. 5, figs. 7-9.)

Pediopsis viridis Fh., Homop. N. Y. St. Cab., p. 59, 1851.
Bythoscopus viridis Walk., List Homop., iv, p. 1162, 1852.
Pediopsis viridis Uhl., Bul. U. S. Geol. Geog. Surv., iii, p. 467, 1877.
Pediopsis viridis Van. D., Can. Ent., xxi, p. 9, 1889.
Pediopsis viridis Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Pediopsis viridis G. & B., Hemip. Colo., p. 73, 1895.
Pediopsis viridis O. & B., Proc. Dav. Acad. Sci., vii, p. 121, 1898.
Pediopsis viridis Osb., 20th Rept. N. Y. St. Ent., p. 504, 1915.
Pediopsis viridis Osb., Me. Agr. Exp. Sta., Bul. 238, p. 89. 1915.
Pediopsis viridis DeL. Tenn. St. Bd. Ent., Bul. 17, p. 16, 1916.
Macropsis viridis Van D., Cat. Hemip. N. A., p. 582, 1917.
Macropsis viridis Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 24, 1919.

Form: Medium sized, smaller than *erythrocephala*, larger than *gleditschiæ.* Length, 4.5 to 5.5 mm. Species with vertex and pronotum obtusely angled, the latter distinctly striated.

Color: Female green, with tips of elytra slightly fuscous; males green, but tinged with fuscous, elytra brownish practically all over. Males with black spot on propleuræ, thus differing from *gleditschiæ.*

External genitalia: Characteristic of the genus, with a very strong chitinous band bounding the posterior margin of the pygofers and extending dorsad in a prominent spine.

Male internal genitalia: Styles very long, with a distinct bend posterior to point of attachment with connective, terminal portion broadly curved and with sides about parallel clear to the tip, except for slight bulge about midway; connective large and stout, Y-shaped when viewed dorsally, with base of Y very heavy and with a dorsal terminal process; œdagus with distinct basal portion from which there extends dorsad a strong process and a longer, posteriorly tapering but dorsally curved portion.

Distribution: Taken in Douglas, Pottawatomie and Ottawa counties.

Hosts: Willow.

Macropsis gleditschiæ (O. & B.).

Pediopsis gleditschiæ O. & B., Proc. Dav. Acad. Sci., vii, pp. 67, 122, 1898.
Pediopsis gleditschiæ Wirtn., Ann. Carn. Mus., iii, p. 218, 1904.
Pediopsis gleditschiæ DeL., Tenn. St. Bd. Ent., Bul. 17, p. 16, 1916.
Macropsis gleditschiæ Van D., Cat. Hemip. N. A., p. 581, 1917.

Form: Smaller than *viridis*. Pronotum obtusely angled and with very distinct striations.

Color: Deeper green than *viridis*. Males slightly fuscous and in both cases the subhyaline elytra slightly brownish. Differs from other green forms in lacking the black spot on the propleuræ in both sexes.

External genitalia: Characteristic of the genus.

Distribution: Found so far only in Hamilton county, but likely occurs in eastern portions of the state as well, for specimens have been taken at Kansas City, Mo.

Hosts: Honey locust.

Genus ONCOPSIS Burm.

Like *Macropsis,* the members of this genus have the pronotum angularly produced beyond the anterior margin of the eyes, but the pronotum differs in being rather more reticulate than striate and with the reticulations running more transversely than obliquely. The pronotum is short and deeply concave posteriorly, with the lateral margins very short.

A single species of this genus has been taken in Kansas.

Oncopsis distinctus (Van D.).

(Pl. 5, figs. 5-6.)

Bythoscopus distinctus Van D., Ent. Am., vi, 224, 1890.
Bythoscopus distinctus O. & B., Proc Dav. Acad. Sci., vii, p. 65, 1898.
Bythoscopus distinctus Osb., 20th Rept. N. Y. St. Ent., p. 504, 1905.
Bythoscopus distinctus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 15, 1916.
Oncopsis distinctus Van D., Cat. Hemip. N. A., p. 588, 1917.
Oncopsis distinctus Weiss, Ent. News, xxix, p. 310, 1918.

Form: A short robust species. Length, 4 to 4.5 mm. Vertex very short, posterior margin raised up from pronotum which is not as sharply angled as in *Macropsis*. Pronotum very deeply reticulate and scutellum somewhat less so. Elytra greatly exceeding abdomen and characterized by having only two anteapical cells and four apical cells.

Color: Vertex, pronotum and scutellum usually greenish, sometimes brownish, and usually pitted with black, the scutellum with triangular dark spots on basal angles. In light forms these black pits and spots may be absent. In typical and dark forms the elytra are quite dark across the base, have a dark band across tip of clavus and the apex darkened. In light specimens the elytra are gray with the dark spot at tip of clavus, cephalad of which appears a light area.

External genitalia: Female, last ventral segment sinuately produced medially and with small median notch; pygofers short and broad, widest at beginning of distal half and then tapering suddenly, slightly exceeded by ovipositor. Male, last ventral segment long, posterior margin truncate; plates long and narrow, about equal to the long narrow pygofers.

Internal male genitalia: Styles with anterior portion distinctly club-like, fastened to connective at middle of club, terminal portion long, slender at base, and gradually thickened to broad and plump tip, this terminal portion slightly curved; connective with three basal processes, the median one long, upper part slender and widening at tip attached to œdagus; œdagus, viewed dorsally, club-like, with a broad, heavy base and tip somewhat bifid, fastened at about its middle to a very characteristic broadly U-shaped structure with the tips of the arms directed strongly caudad; imbedded in the side of the pygofers, at their caudal end, are two small, pointed chitinous bars, one much smaller than the other.

Distribution: Reported only from Douglas and Pottawatomie counties. Probably occurs wherever its host is found.

Hosts: Taken abundantly on walnut.

Subfamily CICADELLINÆ Van D.

This subfamily and the *Gyponinæ* are at once distinguished from all other members of the *Cicadellidæ* by having the ocelli situated above the margin, on the disc of the vertex. The members of the *Cicadellinæ*, however, are cylindrical and elongate in form, as distinguished from the robust and flattened *Gyponinæ*.

Seven genera of this subfamily occur in Kansas.

KEY TO GENERA.*

A. Antennal sockets usually overhung by a distinct ledge which projects beyond curve of head, anterior tibiæ sulcate above or dilated at the extremity. Elytra narrow, not covering lateral margins of abdominal terga.

  B. Thorax roundingly six-angular, posterior margin rounding, with a slight median excavation. Vertex longitudinally furrowed. Claval veins distant. *Aulacizes.*

  BB. Thorax four-angular, posterior margin broadly emarginate, anterior and posterior margins nearly parallel. Claval veins often united in the middle or approaching and tied by a cross nervure.

    C. Vertex triangular, longer than basal width, side margins nearly straight; face as seen from side nearly straight. *Homalodisca.*

    CC. Vertex obtusely rounding, shorter than, or as long as basal width; face as seen from side, roundingly angled. *Oncometopia*

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* Adapted from key by Prof. E. D. Ball, Proc. Ia. Acad. Sci., viii, p. 38, 1901.

AA. Ledge above antennal sockets small, not projecting beyond curve of head. Anterior tibiæ slender, round or triangular. Elytra broad, covering abdominal terga.

- B. Elytra not reticulately veined at apex, head not greatly produced.
  - C. Margin of vertex roundingly obtuse, front inflated.
    - D. Antennæ of male not enlarged at the apex, pronotum not twice as long as scutellum, posterior margin slightly emarginate.
      - E. Lateral margins of vertex not distinctly in line with the outer margins of the eyes *Cicadella.*
      - EE. Lateral margins of vertex in line with the outer margins of the eyes. *Kolla.*
    - DD. Antennæ of male enlarged at apex, pronotum more than twice as long as scutellum, posterior margin deeply emarginate. *Helochara.*
  - CC. Vertex flat, margin distinct, acutely angled with front. *Graphocephala.*
- BB. Elytra reticulately veined on apical third. Head often produced into a triangle, longer than pronotum. *Dræculacephala.*

Genus AULACIZES A. & S.

In this genus the antennal sockets are overhung by a distinct ledge which projects beyond the line of the head. The rather long vertex is bluntly rounded. The pronotum is six-sided, widest at the lateral angles, and with posterior margin slightly emarginate. The anterior tibiæ are sulcate above. The elytra are long and narrow, not covering the terga of the abdomen.

A single specimen of this genus occurs in Kansas.

Aulacizes irrorata (Fabr.).

(Pl. 6, figs. 1-3.)

Cicada irrorata Fabr., Ent. Syst., iv, p. 33, 1794.
Cicada nigripennis Fabr., Ent. Syst., iv, p. 32, 1794.
Tettigonia irrorata Burm., Handb. d. Ent., ii, p. 119, 1835.
Proconia nigripennis Walk., List. Homop., iii, p. 783, 1851.
Aulacizes rufiventris Walk., List. Homop., iii, p. 796, 1851.
Aulacizes irrorata Walk., List. Homop., Suppl., p. 236, 1858.
Aulacizes irrorata Stal, Hemip. Fabr., ii, p. 64, 1869.
Aulacizes irrorata Uhl., Bul. U. S. Geol. Geog. Surv., 1, p. 357, 1876.
Aulacizes irrorata Woodw., Bul. Ill. St. Lab. Nat. Hist., iii, p. 19, pl. 2, figs. 15-18, 1887.
Aulacizes irrorata Ball, Proc. Ia. Acad. Sci., viii, p. 40, 1901.
Aulacizes irrorata Osb., 20th Rept. N. Y. St. Ent., p. 509, 1905.
Aulacizes irrorata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 17, 1916.
Aulacizes irrorata Van D., Cat. Hemip. N. A., p. 594, 1917.
Aulacizes irrorata Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 2, 1918.
Aulacizes irrorata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 27, 1919.

Form: A large, long species. Length, 11.5 to 12.5 mm. Head a little wider than pronotum, slightly longer than broad. Vertex very obtusely angulate, its surface irregular and with a prominent median furrow which widens greatly anteriorly. Pronotum 6-sided, surface irregular, posterior margin slightly concave. Elytra long and narrow, not completely covering terga of abdomen.

Color: Varying from light to dark reddish-brown, irrorate with yellow. Scutellum with an extra large yellow spot before apex; vertex and pronotum with more yellow than elytra except for yellow costal band on the latter. Front irregularly black below, pale above, with four black spots in a square above.

External genitalia: Female, last ventral segment a little over twice as long as broad, lateral margins much narrowed posteriorly, posterior margins produced with rather straight sides to a distinct but shallow median notch; pygofers narrow basally and still more distally, but wide at middle, equal to or exceeded by tip of ovipositor. Male, valve very small, often barely seen from under tip of last ventral segment; plates together forming a triangle a little broader than long, clothed with fine hairs; pygofers broad and short, about equalling the plates.

Internal male genitalia: Styles broad and slightly chitinized at base, tapering rather suddenly a little past their middle to heavily chitinized neck-like processes which widen distally into the shape of a bird's head, the attachment to the plates being a large conspicuous lobe at the base of the neck; connective long and slender, U-shaped, with arms sinuate at base and then reaching to œdagus as a long strap, with median longitudinal third heavily chitinized, this heavy chitinous band broadening toward the tip; œdagus with heavy body portion and three pairs of processes, a pair of blunt dorsal ones and two pairs of caudal processes, one pair short and lightly chitinized apically and situated dorsad of a longer and heavily chitinized pair.

Distribution: Taken in Cherokee and Montgomery counties. Occurs further north too, for specimens have been taken near Kansas City, Mo.

Hosts: Collected from weeds and shrubs. De Long reports taking it on oak.

Genus HOMALODISCA Stal.

Antennal ledge as in *Aulacizes,* head with prominent eyes, wider than pronotum, and as long as width between eyes. Front and vertex forming an acute angle. Pronotum four-angular, short, anterior and posterior margins nearly parallel. Elytra long and narrow, hyaline, claval nervures united near the middle. Anterior tibiæ sulcate.

Homalodisca triquetra (Fabr.).

(Pl. 6, figs. 4-6.)

Cicada triquetra Fabr., Syst. Rhyng., p. 63, 1803.
Tettigonia vitripennis Germ., Mag. d. Ent., iv, p. 61, 1821.
Tettigonia coagulata Say, Insects of La., p. 13, 1832.
Tettigonia ichthyocephala Sign., Ann. Soc. Ent. Fr., Ser. 3, iii, p. 494, 1854.
Tettigonia triquetra Sign., Ann. Soc. Ent. Fr., Ser. 3, iii, p. 240, 1855.
Ciccus triquetra Walk., List Homop., Suppl., p. 243, 1858.
Proconia admittens Walk., List Homop., Suppl., p. 227, 1858.
Proconia aurigena Walk., List Homop., Suppl., p. 228, 1858.
Proconia excludens Walk., Ins. Saund., Homop., p. 98, 1858.
Homalodisca triquetra Stal, Hemip. Fabr., ii, p. 64, 1869.
Homalodisca triquetra Fowl., Biol. Centr. Am., Homop., ii, p. 221, pl. 14, fig. 1, 1899.
Homalodisca triquetra Ball, Proc. Ia. Acad. Sci., viii, p. 47, pl. 2, fig. 1, 1901.
Homalodisca triquetra DeL., Tenn. St. Bd. Ent., Bul. 17, p. 19, 1916.
Homalodisca triquetra Van D., Cat. Hemip. N. A., p. 594, 1917.
Homalodisca triquetra Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 2, 1918.
Homalodisca triquetra Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 30, 1919.

Form: A long narrow species. Length, 13 mm. Vertex as long as basal width, apex bluntly rounding, with longitudinal median depression. Pronotum very coarsely pitted, short, anterior and posterior margins about parallel. Elytra long and narrow, hyaline, venation prominent.

Color: Brownish, with vertex, pronotum and scutellum irrorate with yellow. Elytra smoky, especially apically, with an opaque red spot of varying size on costal margin of the apical cells.

External genitalia: Female, last ventral segment very large and long, slightly narrowing to acute lateral angles between which the posterior margin is broadly incised to fully one-third its depth by a triangular, obtusely pointed and sinuately margined incision; pygofers broadest at their middle, and slightly exceeded by tip of ovipositor. Male, plates together forming a triangle wider than long, tips very acute; pygofers short but very broad, narrowed at base, slightly widening posteriorly, and covered with long fine hairs, with a short blunt chitinous process imbedded in side of each.

Male internal genitalia: Styles very small for such a large form, broadest at base and tapering sinuately to blunt apex, apical half much roughened with fine teeth; connective very short, consisting of a transverse band widest at the middle, especially posteriorly; œdagus very large and peculiar, body with a long anteriorly and vertically directed process to meet the connective which extends ventrad from the styles, with a stout dorsal process and two pairs of terminal processes, an outer short and blunt process and an inner large, sharply pointed process.

Distribution: A southern species not yet reported from Kansas. It may occur in the southern portions of the state.

Hosts: Unknown.

Genus ONCOMETOPIA Stal.

The members of this genus have a distinct ledge over the antennal socket. The eyes are prominent, making the head wider than the pronotum. Vertex is rounded and obtusely joined to the front. Pronotum is short, four-angular, the anterior and posterior margins nearly parallel, lateral margins slightly narrowed behind. Elytra long and narrow, not covering abdominal terga. Anterior tibiæ are slightly sulcate above.

Two species and one variety of this genus have been found in the state.

KEY TO SPECIES.

A. Size large, 12 mm. or more, cross nervure cephalad of fork of first sector. *undata.*

AA. Size smaller, 9 mm. or less, cross nervure caudad of fork of first sector. *lateralis.*

Oncometopia undata (Fabr.).

(Pl. 7, figs. 1-3.)

Cicada undata Fabr., Ent. Syst., iv, p. 32, 1794.
Cicada orbona Fabr., Ent. Syst., Suppl., p. 530, 1798.
Tettigonia undata Germ., Mag. d. Ent., iv, p. 61, 1821.
Proconia undata Walk., List Homop., iii, p. 783, 1851.
Proconia nigricans Walk., List Homop., iii, p. 783, 1851.
Proconia clarior Walk., List Homop., iii, p. 784, 1851.
Proconia lucernea Walk., List Homop., iii, p. 785, 1851..
Proconia marginata Walk., List Homop., iii, p. 785, 1851.
Proconia badia Walk., List Homop., iii, p. 786, 1851.
Proconia scutellata Walk., List Homop., iii, p. 786, 1851.
Proconia tenebrosa Walk., List Homop., iii, p. 787, 1851.
Proconia plagiata Walk., List Homop., iii, p. 788, 1851.
Tettigonia undata Sign., Ann. Soc. Ent. Fr., ser. 3, ii, p. 486, pl. 17, fig. 5, 1854.
Oncometopia undata Stal, Hemip. Fabr., ii, p. 62, 1869.
Oncometopia undata Woodw., Bul. Ill. St. Lab. Nat. Hist., iii, p. 15, pl. 2, figs. 10-14, 1887.
Gypona? badia Van D., Ent. News, v, p. 157, 1894.
Oncometopia undata Fowl., Biol. Centr. Am., Homop., ii, p. 231, pl. 14. figs. 19, 20, 1899.
Oncometopia undata Ball, Proc., Ia. Acad. Sci., viii, p. 41, 1901.
Oncometopia undata Osb., 20th Rept. N. Y. St. Ent., p. 509, 1905.
Oncometopia undata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 18, 1916.
Oncometopia undata Van D., Cat. Hemip. N. A., p. 591, 1917.
Oncometopia undata Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 2, 1918.
Oncometopia undata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 28, 1919.

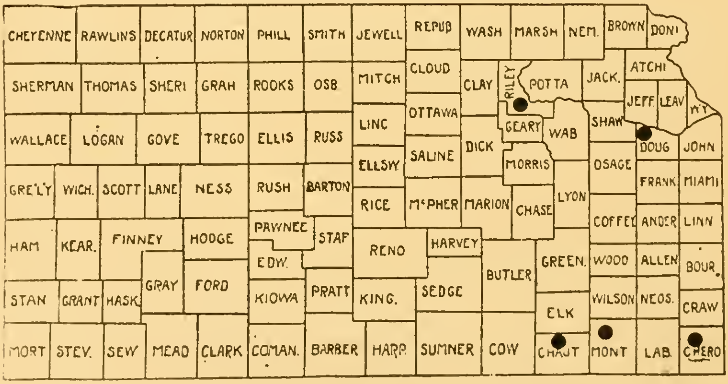
Form: A large, almost parallel-sided form. Length, 13 mm. Head broad, with prominent eyes. Vertex with sides very broadly rounded, very obtuse at apex, about two-thirds as long as basal width. Pronotum half wider than long, elevated. Elytra long and narrow, claval veins slightly approaching each other and usually with a cross nervure.

Color: Vertex, anterior margin of pronotum and scutellum rusty orange. Vertex with an incomplete black circle from which run out six or eight radiating lines. Scutellum also marked with dark lines. Pronotum, except anterior margin, and elytra varying much in color from slaty blue to brown and bright red. Elytra sometimes bear a large pruinose spot just back of the middle. Front orange with black median and lateral lines.

External genitalia: Female, last ventral segment longer than preceding, slightly narrowed posteriorly, posterior margin composed of three lobes, the lateral ones distinctly longer than the median; pygofers broad and short, sparsely covered with short, stout hairs and about equalled by the ovipositor. Male, plates small, forming a triangle about as long as wide, half the width of the last ventral segment; pygofers tapering posteriorly from the broad base, nearly twice the length of the plates; pygofers bearing an upturned chitinous process on caudal margin.

Internal male genitalia: Styles small for such a large species, pointed at anterior end, with a very large process for attachment to connective, slightly narrowed medially and then widened and narrowing to slightly out-turned and pointed tip, bearing several stout hairs on distal third of lateral margin; connective U-shaped with the loop very wide; œdagus large, prolonged anteriorly to meet connective, and with a very large anterior process extending dorsad, main portion dividing at apex into large rounded anterior process, a median smaller triangular one, and a posterior, acutely pointed still smaller one, a posterior process, also extending dorsad, long and narrow; long, crooked, slender chitinous bars extend down from base of anal tube to cephalo-dorsal portion of œdagus.

Distribution: Found in the eastern part of the state, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
FRANK
MIAMI
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
GREEN.
WOOD
ALLEN
BOUR.
EDW.
BUTLER
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS.
CRAW
ELK
MORT
STEV.
SEW
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW
CHAUT
MONT
LAB.
CHERO

Hosts: Taken sweeping among weeds. De Long took specimens from ironweed.

Oncometopia lateralis (Fabr.).

(Pl. 8, figs. 1-2.)

Cercopis lateralis Fabr., Ent. Syst., Suppl., p. 524, 1798.
Cercopis marginella Fabr., Syst. Rhyng., p. 96, 1803.
Cercopis costalis Fabr., Syst. Rhyng., errata, 1803 (n. n. for *marginella* Fabr).
Tettigonia striata Walk., List Homop., iii, p. 775, 1851.
Tettigonia lugens Walk., List Homop., iii, p. 775, 1851.
Tettigonia pyrrhotelus Walk., List Homop., iii, p. 775, 1851.
Proconia costalis Walk., List Homop., Suppl., p. 224, 1858.
Proconia costalis Stal, Homop. Fabr., ii, p. 118, 1869.
Proconia costalis Van D., Can. Ent., xxi, p. 9, 1889.
Proconia costalis Osb., Proc., Ia. Acad. Sci., i, pt. 2, p. 125, 1892.
Oncometopia costalis Sloss., Ent. News, v, p. 5, 1894.
Oncometopia costalis G. & B., Hemip. Colo., p. 81, 1895.
Oncometopia lateralis Ball., Proc. Ia. Acad. Sci., viii, p. 44, 1901.
Oncometopia lateralis Osb., 20th Rept. N. Y. St. Ent., p. 509, 1905.
Oncometopia lateralis Osb., Me. Agr. Exp. Sta., Bul. 238, p. 99, 1915.
Oncometopia lateralis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 18, 1916.
Oncometopia lateralis Van D., Cat. Hemip., N. A., p. 592, 1917.
Oncometopia lateralis Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 2, 1918.
Oncometopia lateralis Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 29, 1919.

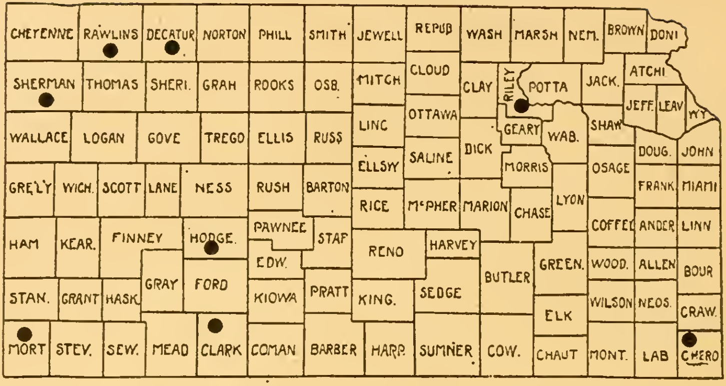
Form: Shorter than preceding species, but quite broad. Length, 7 to 8 mm. Head, about half as long as wide, vertex obtusely angled, eyes prominent. Pronotum short, anterior and posterior margins about parallel. Elytra broad and only slightly exceeding abdomen.

Color: Vertex, pronotum and scutellum black, irrorate with yellow. Elytra red to slaty blue, nervures black, frequently with light or yellow margins. Face black irrorate with yellow. Narrow yellow lateral stripe starts from eye, crosses thorax, and extends along margin of abdomen to pygofers.

External genitalia: Female, last ventral segment about twice as long as preceding, lateral margins narrowed posteriorly, posterior margin with broad incision on median third which reaches about one-fourth of way to base; pygofers large, widest at middle, exceeding ovipositor. Male, plates together forming a triangle longer than wide; pygofers long and narrow, exceeding plates, covered with fine hairs as are the plates.

Internal male genitalia: Styles much as in *undata*, proportionally broader, outer margin nearly straight, inner margin with broad lobe half way between apex and process for attachment to œdagus, apex with slight inwardly directed point, lateral margins of apical third serrate, a few slender hairs near lateral margin about one-third the distance from the tip; connective consisting of a broad strap-like piece between the styles with the ventral surface bearing a large square portion medially; œdagus large, produced anteriorly to meet connective, with a large dorsal process running first caudad and then cephalad, and two pairs of long slender terminal lobes running dorsad, the first pair broader and longer than the posterior pair.

Distribution: This species occurs throughout the state as shown by the following map.


CHEYENNE
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FINNEY
HODGE.
PAWNEE
STAF
COFFEE
ANDER
LINN
EDW.
RENO
HARVEY
GREEN.
WOOD.
ALLEN
BOUR
STAN.
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
BUTLER
WILSON
NEOS.
CRAW.
ELK
MORT
STEV.
SEW.
MEAD
CLARK
COMAN
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Osborn reports this species as occurring in bogs and low ground; De Long records it from grasses and weeds.

Oncometopia lateralis var. *limbata* (Say).

Tettigonia limbata Say, Jl. Acad. Nat. Sci. Phila., iv, p. 340, 1825.
Tettigonia costalis Sign., Ann. Soc. Ent. Fr., ser. 3, iii, p. 821, 1855.
Tettigonia septentrionalis Walk., List Homop., Suppl., p. 193, 1858.
Oncometopia limbata Van D., Psyche, v, p. 389, 1890.
Oncometopia lateralis var. limbata Ball, Proc. Ia. Acad. Sci., viii, p. 45, 1901.
Oncometopia lateralis var. limbata Van D., Cat. Hemip. N. A., p. 593, 1917.

Form: Somewhat smaller and narrower than preceding form, elytra longer.

Color: Black, vertex and face somewhat irrorate with yellow. Two small orange spots about one-third distance from anterior margin and in line with ocelli. Lateral yellow line broad and distinct.

Distribution: Rawlins county has furnished us our only specimen of this variety.

Hosts: Unknown.

Genus CICADELLA Latr.

In this genus the ledges over the antennal sockets are not prominent. The vertex is bluntly conical, and slightly sloping, with the lateral margins not in a distinct line with the curve of the eye. Pronotum rather long, broadest at lateral angles. The elytra cover the terga of the abdomen and are not reticulately veined at the apex.

Two members of this genus and two varieties have been collected in Kansas, but two other species likely occur and are therefore included in the key.

KEY TO SPECIES.

A. Head as wide as pronotum, vertex wider than long, face in profile strongly curved.
  B. Head marked with distinct lines forming a pattern.
    C. Head pattern complex, no parallel lateral lines; length over 6 mm. *hieroglyphica.*
    CC. Head pattern simple, with median and lateral parallel lines; length 6 mm. or less. *gothica.*
  BB. Head marked with definite spots, not forming a distinct pattern. *atropunctata.*
AA. Head narrower than pronotum, vertex as long as wide, face in profile only slightly curved. *occatoria.*

Cicadella hieroglyphica (Say).

(Pl. 9, figs. 1-3.)

Tettigonia hieroglyphica Say, Jl. Acad. Nat. Sci. Phila., vi, p. 313, 1831.
Tettigonia hieroglyphica Sign., Ann. Soc. Ent. Fr., ser. 3, iii, p. 805, 1855.
Tettigonia hieroglyphica G. & B., Hemip. Colo., p. 81, 1895.
Tettigonia hieroglyphica Ball, Proc. Ia. Acad. Sci., viii, p. 51, 1901.
Tettigoniella hieroglyphica Van D., Trans. San Diego Soc. Nat. Hist., ii, p. 52, 1914.
Tettigoniella hieroglyphica DeL., Tenn. St. Bd. Ent., Bul. 17, p. 20, 1916.
Cicadella hieroglyphica Van D., Cat. Hemip. N. A., p. 597, 1917.
Cicadella hieroglyphica Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 3, 1918.

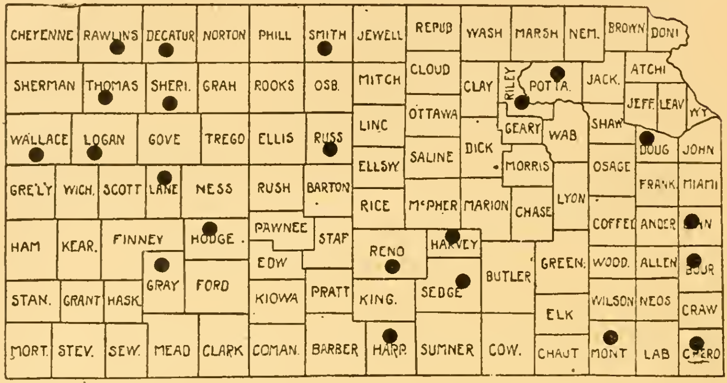
Form: Rather stout. Length, 6 to 7 mm. Vertex bluntly conical, wider than long. Pronotum nearly twice as wide as long, posterior angles broadly rounded, posterior margin medially emarginated. Elytra broad, but exceeding the abdomen.

Color: Varying from brick-red to greenish and slaty blue. Black markings on vertex very strong and distinct, enclosing a light colored T on basal half. Elytra with pale bands along costal, claval and sutural margins.

External genitalia: Female, last ventral segment about as wide as long, lateral margins narrowed posteriorly, posterior margin triangularly produced; pygofers long and narrow, equalling or slightly exceeding ovipositor, bearing a few stout hairs. Male, last ventral segment less than twice as wide as long; plates long, broad at base, but tapering to long acute apices, margins fringed with short hairs; pygofers long and narrow, equalling or exceeding plates and bearing stout hairs.

Male internal genitalia: Styles short, distinctly bent in at point of attachment to connective by a large, heavily chitinized lobe, then curving outward and tapering gradually to blunt apex, with an outwardly projecting process; connective slender, Y-shaped, stem of Y broadening to broad base; œdagus with pair of short processes extending dorsad from its point of attachment to connective, a long process leaving it dorsally from a point a little past its middle, and a similar longer one leaving it apically, the latter to the left of the former. These two processes are narrow and long, narrowest at the base, and widening to a point shortly before the apex where they are the widest, the right one wider than the left one, and then tapering to the acute tips. A pair of somewhat narrow triangular chitinous processes extend from the base of the anal tube to the main body of the œdagus.

Distribution: This species is well distributed over the state as shown by the following map: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ELLSW
SALINE
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OSAGE
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HASK.
KIOWA
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NEOS
CRAW
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT
LAB
CHERO

Hosts: Taken abundantly on willows.

Cicadella hieroglyphica var. *dolobrata* (Ball).

Tettigonia hieroglyphica var. dolobrata Ball, Proc. Ia., Acad. Sci., viii, p. 52, pl. 3, fig. 2, 1901.
Tettigonia hieroglyphica var. dolobrata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 20, 1916.
Cicadella hieroglyphica var. dolobrata Van D., Cat. Hemip. N. A., p. 597, 1917.
Cicadella hieroglyphica var. dolobrata Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 3, 1918.

This is a smaller form than the preceding, appearing more robust. In color it is typically black, retaining a few of the light markings of the typical *hieroglyphica* on the front, vertex, pronotum and scutellum, and generally having the claval sutures light.

Genitalia as in preceding form.

Distribution: Occurs along with the typical form.

Hosts: Willows.

Cicadella hieroglyphica var. *uhleri* (Ball).

Tettigonia hieroglyphica var. uhleri Ball, Proc. Ia. Acad. Sci., viii, p. 52, pl. 3, fig. 3, 1901.
Cicadella hieroglyphica var. uhleri Van D., Cat. Hemip. N. A., p. 597, 1917.
Cicadella hieroglyphica var. uhleri Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 3, 1918.

This variety is slightly larger than typical *hieroglyphica*, being more robust and with longer elytra. It varies very greatly in color, running from a brick-red through several shades of bluish or grayish green, and even to a fairly distinct bright green. The black markings of the vertex are much reduced in size, appearing only as narrow lines. Genitalia as in typical *hieroglyphica*.

Distribution: Much rarer with us than the two preceding forms. Reported from Douglas, Cherokee and Riley counties.

Hosts: Willows.

Cicadella gothica (Sign.).

Tettigonia gothica Sign., Ann. Soc. Ent. Fr., ser. 3, ii, p. 345, pl. 11, fig. 6, 1854.
Tettigonia hieroglyphica Harr., Hitchcock's Geol. Mass., edn. 2, p. 580, 1835.
Tettigonia similis Woodw., Bul. Ill. St. Lab. Nat. Hist., iii. p. 25, 1887.
Diedrocephala hieroglyphica Prov., Pet. Faune Ent. Can., iii, p. 267, 1889.
Tettigonia hieroglyphica Harr., Ottawa Nat., vi, p. 32, 1892.
Tettigonia similis Van D., Ent. News, v, p. 156, 1894.
Tettigonia similis Van D., Ent. News, v, p. 156, 1894.
Tettigonia similis O. & B., Proc. Ia. Acad. Sci., iv, p. 231, 1897.
Tettigonia gothica Ball, Proc. Ia. Acad. Sci., viii, p. 54, 1901.
Tettigonia gothica Osb., 20th Rept. N. Y. St. Ent., p. 510, 1905.
Tettigonia gothica Van D., Can. Ent., xli, p. 383, 1909.
Tettigonia gothica Osb., Me. Agr. Exp. Sta., Bul. 238, p. 100, 1915.
Tettigonia gothica DeL., Tenn. St. Bd. Ent., Bul. 17, p. 21, 1916.
Cicadella gothica Van D., Cat. Hemip. N. A., 597, 1917.
Cicadella gothica Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 3, 1918.

Form: Much like *hieroglyphica* but smaller. Length, 5.5 to 6 mm. Vertex more pointed than in preceding species, wider than long. Nervures of elytra distinct.

Color: Varies from light reddish to grayish-green. Vertex reddish or greenish-yellow, apex with black spot, margins of reflexed portions, a line from these to ocelli, and a pair of loops on the disc, black. Scutellum with distinct black marks. Elytra grayish-green or reddish, unicolorous, or irrorate with yellow.

External genitalia: Female, last ventral segment very long, raised medially, lateral margins narrowed posteriorly, posterior margin triangularly produced; pygofers long, bearing a few heavy hairs and equalled or slightly exceeded by the ovipositor. Male, last ventral segment about twice as broad as long, anterior and posterior margins parallel; plates very long and slender, margins with fine hairs and also with a row of stout hairs or bristles, slightly exceeding the spiny pygofers.

Distribution: Taken only in Douglas, Riley and Pottawatomie counties.

Hosts: Osborn reports taking this species from grass land and on birch and willow. De Long records taking it from oak.

Cicadella atropunctata (Sign.).

(Pl. 9, figs. 4-5.)

Tettigonia atropunctata Sign., Ann. Soc. Ent. Fr., p. 354, 1854.
Tettigonia circellata Bak., Psyche, viii, p. 285, 1898.
Tettigonia atropunctata Fowl., Biol. Centr. Am., Homop., ii, p. 266, pl. 17, fig. 27, 1900.
Tettigonia atropunctata Ball, Proc. Ia. Acad. Sci., viii, p. 55, pl. 4, fig. 2, 1901.
Tettigonia circellata Van D., Trans. San Diego Soc. Nat. Hist., ii, p. 53, 1914.
Tettigonia circellata Essig, Inj. Benef. Ins. Calif., edn. 2, p. 66, 1915.
Cicadella circellata Van D., Cat. Hemip. N. A., p. 598, 1917.
Cicadella circellata? Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 3, 1918.

Form: Longer and more slender than *gothica*. Length, 6 to 7 mm. Vertex bluntly rounded, about three-fourths as long as broad, two-thirds the length of the pronotum. Elytra long and narrowing posteriorly, giving the insect a wedge-shaped appearance.

Color: Vertex, front, face, anterior margin of pronotum and under side, yellowish; posterior part of pronotum and elytra bluish or bluish-green. Front with short median line, two broken lateral lines and margin, black. Clypeus black medially at apex; vertex with spot at apex, in the middle, outside of each ocellus, and a crescent on each side anteriorly, black. Pronotum with seven black dots near anterior margin and three on basal half. Nervures of elytra black.

External genitalia: Female, last ventral segment much longer than broad, about three times as long as penultimate segment, keeled, posterior margin greatly and acutely produced; pygofers very long and narrow, exceeding the ovipositor. Male, last ventral segment longer than preceding one, anterior and posterior margins parallel, as are the lateral margins; plates very long and slender, acutely pointed, and with row of stout hairs or spines along margin, slightly exceeded by the long and narrow pygofers.

Internal male genitalia: Styles small, basal portion heavier, posterior portion slender, curved, terminating acutely; connective slender, Y-shaped, the stem of the Y broadened basally; œdagus with broad, rather truncate base, a stout, blunt process running dorsad, and a pair of larger, broad-based, and acutely pointed, dorsally directed, terminal processes.

Distribution: Has not yet been reported from Kansas, but should occur in southern part of the state.

Hosts: Essig reports this species as a general feeder on such plants as grape, blackberry, raspberry, sunflower, etc.

This species so closely fits Signoret's description of *Tettigonia atropunctata*, that, with Dr. E. D. Ball, we do not follow Van Duzee's synonymy.

Cicadella occatoria (Say).

Tettigonia occatoria Say, Jl. Acad. Nat. Sci., Phila., vi, p. 311, 1831; Compl. Writ. ii, p. 385.

Tettigonia occatoria Say, Ann. Soc. Ent. Fr., ser. 3, ii, p. 353, pl. 18, fig. 11, 1854.

Tettigonia compta Fowl., Biol. Centr. Am., Homop., ii, p. 271, 1900.

Tettigonia occatoria Fowl., Biol. Centr. Am., Homop., ii, p. 279, pl. 18, fig. 29, 1900.

Tettigonia occatoria Ball, Proc. Ia. Acad. Sci., viii, p. 57, pl. 4, fig. 4, 1901.

Tettigoniella occatoria Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 212, 1909.

Tettigoniella occatoria Osb., Ohio Nat., ix, p. 462, 1909.

Tettigoniella occatoria DeL., Tenn. St. Bd. Ent., Bul. 17, p. 21, 1916.

Cicadella occatoria Van D., Cat. Hemip. N. A., p. 598, 1917.

Cicadella occatoria Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 3, 1918.

Cicadella occatoria Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 31, 1919.

This species, though surely in Kansas, has seemingly not yet been taken. It is a long narrow form, about 6 mm. in length. The color is yellow, and it may be readily recognized by the longitudinal, brown stripes, four on the vertex, five on the pronotum, and with the elytra also striped. Female, last ventral segment less than twice as long as preceding one, posterior margin obtusely rounding or truncate; pygofers long and narrow, equalling ovipositor. Male, plates broad at base, very acute apically; pygofers long, narrow, scarcely tapering, much exceeding plates.

Hosts: According to De Long this species was taken on weeds and shrubs.

Genus KOLLA Dist.

Distant describes this genus as follows: "Allied to *Tettigoniella,* but differing by the structure of vertex of the head, which is subconically narrowed anteriorly, with the lateral margins in a line with the outer margins of the eye; near the inner margin of the eyes the vertex is also more or less foveate; face with the lateral areas somewhat strongly, transversely striate, and centrally, longitudinally sinuate and flattened."

Three species of this genus have been collected in Kansas.

KEY TO SPECIES.

A. Conspicuously marked with bands and stripes.
    B. Elytra striped; over 5.5 mm. in length. *bifida.*
    BB. Elytra not striped; 5 mm or less in length. *geometrica.*
AA. Not marked with bands and stripes, rather uniformly brownish or black. *hartii.*

Kolla bifida (Say).

(Pl. 7, figs. 4-5.)

Tettigonia bifida Say, Jl. Acad. Nat. Sci. Phila., vi, p. 313, 1831; Compl. Writ., ii. p. 387.
Tettigonia bifida Fh., Homop. N. Y. St. Cab., p. 55, 1851.
Tettigonia tenella Walk., List Homop., iii, p. 770, 1851.
Tettigonia bifida Sign., Ann. Soc. Ent. Fr., ser. 3, ii, p. 11, pl, 1, fig. 11, 1854.
Helochara bifida Prov., Pet. Faune Ent. Can., iii, p. 338, 1890.
Tettigonia bifida Van D., Bul. Buf. Soc. Nat. Sci., v. p. 196, 1894.
Tettigonia bifida O. & B., Proc. Ia. Acad. Sci., iv, p. 175, 1897.
Tettigonia bifida Ball, Proc. Ia. Acad. Sci., viii, p. 58, pl. 5, fig. 1, 1901.
Tettigonia bifida Osb., 20th Rept. N. Y. St. Ent., p. 509, 1905.
Tettigonia bifida Osb., U. S. Dept. Agr. Bur. Ent., Bul. 108, p. 63, 1912.
Tettigonia bifida Osb., Me. Agr. Exp. Sta., Bul. 238, p. 99, 1915.
Kolla bifida DeL., Tenn. St. Bd. Ent., Bul. 17, p. 22, 1916.
Kolla bifida Van D., Cat. Hemip., N. A., p. 598, 1917.
Kolla bifida Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 5, 1918.
Cicadella bifida Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 31, 1919.

Form: A fairly large, robust species. Length, 5.5 to 6 mm. Vertex about twice as wide as long, bluntly conical. Pronotum slightly wider than head, and nearly twice as long, anterior margin broadly convex, posterior margin very slightly concave, lateral and humeral margins about equal. Elytra broad, venation very simple, there being no cross nervures before the apical cells.

Color: Vertex black with two white spots at apex and a median and basal band yellowish or white. Face very dark brown, lighter laterally. Pronotum greenish with anterior margin black, followed by a yellow band, posterior margin white or greenish-white, preceded by a black band.

Scutellum yellow with black transverse impression. Elytra green, nervures broadly black, apical cells smoky.

External genitalia: Female, last ventral segment long, convex, lateral margins tapering posteriorly and posterior margin with median half roundingly produced; pygofers long and narrow, forming a keel medially, exceeding ovipositor and clothed with very coarse large hairs. Male, plates short, wide at base, apices quite acutely produced, less than half the length of the long and narrow pygofers; lateral margins of plates and the pygofers with large, coarse hairs.

Internal male genitalia: Styles short, anterior end acutely pointed, distal half broad, apex truncate with laterally directed tooth; connective T-shaped with short cross piece and long stem, dorsally directed, to meet œdagus, the two parts seeming to be distinct pieces; œdagus consisting of two L-shaped pieces, the short branches directed dorsad and the long slender ones caudad and generally crossing each other; a pair of L-shaped processes with thickened terminal portions extend down from the anal tube to the œdagus.

Distribution: Taken in Douglas, Cherokee, Pottawatomie and Riley counties.

Hosts: Swept from grasses in low places.

Kolla geometrica (Sign.).

(Pl. 8, figs. 5-6.)

Tettigonia geometrica Sign., Ann. Soc. Ent. Fr., ser. 3, ii, p. 12, pl. 1, fig. 12, 1895.
Tettigonia psittacella Fowl., Biol. Centr. Am., Homop., ii, p. 290, pl. 19, fig. 26, 1900.
Tettigonia geometrica Ball, Proc. Ia. Acad. Sci., viii, p. 59, pl. 5, fig. 2, 1901.
Kolla geometrica Dist., Ann. Mag. Nat. Hist., ser. 8, i. p. 530, 1908.
Tettigonia geometrica Osb., Ohio Nat., ix. p. 461, 1909.
Kolla geometrica DeL., Tenn. St. Bd. Ent., Bul. 17, p. 23, 1916.
Kolla geometrica Van D., Cat. Hemip. N. A., p. 599, 1917.
Kolla geometrica Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 5, 1918.
Kolla geometrica Ols., Bul. Brooklyn Ent. Soc., xiii, p. 119, 1918.
Cicadella geometrica Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 32, 1919.

Form: Like *bifida* in structure but smaller. Length, 4.5 to 5 mm. Vertex about twice as long as wide, bluntly rounded. Pronotum as in *bifida*, wider than the head. Elytra long, not as broad as in *bifida*, venation simple, lacking cross veins before apical cells.

Color: Vertex black, with two yellow apical spots and median and basal yellow bands. Face black. Pronotum and scutellum as in *bifida* but with narrower bands and therefore a larger green discal portion. Elytra green, except for smoky apical cells, with three spots in front of these and costal margin light.

External genitalia: Female, last ventral segment about as in *bifida*, perhaps not produced quite as much on posterior margin. Male, plates as in *bifida* though perhaps more acutely pointed.

Internal male genitalia: Styles relatively shorter and broader than in *bifida;* œdagus with upright arms of the L relatively longer than in *bifida;* lower portion of chitinous processes extending down from anal tube also relatively heavier than in *bifida.*

Distribution: Taken in Cherokee county only.

Hosts: De Long reports sweeping this species from weeds and grasses in pastures, and especially from the ironweed, *Vernonia glauca.*

Kolla hartii (Ball).

(Pl. 7, figs. 6-7.)

Tettigonia hartii Ball, Proc. Ia. Acad. Sci., viii, p. 61, pl. 5, fig. 4, 1901.
Tettigonia hartii DeL., Tenn. St. Bd. Ent., Bul. 17, p. 20, 1916.
Kolla hartii Van D., Cat. Hemip. N. A., p. 599, 1917.
Kolla hartii Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 5, 1918.

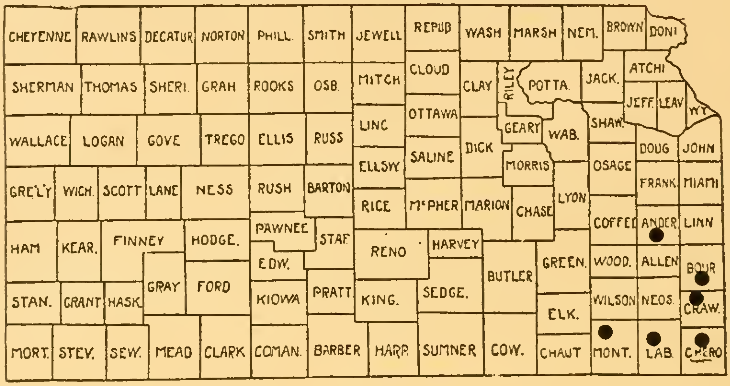
Form: Shorter and stouter than preceding species. Length, 3.75 to 5 mm. Vertex conical, obtusely rounding, twice as wide as long. Pronotum twice as long as vertex, about three-fifths as long as wide. Elytra broad, venation simple, as in *bifida.*

Color: Female, brownish. Vertex with pair of black spots on posterior margin and brown arcs that cover front on either side of a light median line extending up on to apex of vertex. Pronotum with irregular dark spots near anterior margin. Scutellum with dark triangular spots in basal angles. Elytra with nervures pale, claval margins lined with light blue. Male, shining black, with space around ocelli and apex of scutellum pale. Spot on apex of vertex white, front pale with dark arcs on either side of median pale line which has black borders that often enlarge to eliminate the pale line.

External genitalia: Female, last ventral segment about three-fifths as long as wide, posterior margin truncate, very slightly sinuate on either side of a very small median tooth; pygofers broad and long, forming median keel, exceeding ovipositor and bearing few large coarse hairs. Male, plates wide at base but tapering to long acute point posteriorly, with coarse hairs on lateral margins, much exceeded by the long, coarsely haired pygofers.

Internal male genitalia: Styles longer than in preceding members of the genus, apices curved inward; connective as in preceding species; œdagus U-shaped when viewed laterally, having two short processes extending more or less dorsad and a single process, twice as long, extending caudad, the base of the U being formed by this process; a very characteristic club-shaped process extends downward from the base of the anal tube.

Distribution: This species seemingly occurs only in the southeastern portion of the state as shown by the following map: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ELLSW
SALINE
MORRIS
OSAGE
FRANK
MIAMI
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE.
PAWNEE
STAF.
RENO
HARVEY
EDW.
BUTLER
GREEN.
WOOD.
ALLEN
BOUR
STAN.
GRANT
HASK.
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
WILSON
NEOS.
CRAW.
ELK.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB.
CHERO

Hosts: De Long reports this species as common on grasses, especially *Aristida gracilis.*

Genus HELOCHARA Fh.

In this genus the head is slightly wider than the prothorax and considerably broader than long, slightly obtusely angled, and with the reflexed portion of the front distinctly elevated. The pronotum is long, being twice as long as the scutellum, and with such distinct lateral and humeral margins as to appear six-angular. Scutellum small, partially covered by pronotum. Elytra coriaceous, except for apical cells, veins distinct. Antennæ of males plate-like on apical third.

The single species of this genus occurring in the United States is found in Kansas.

Helochara communis Fh.

(Pl. 10, figs. 3-4.)

Helochara communis Fh., Homop. N. Y. St. Cab., p. 56, 1851.
Tettigonia herbida Walk., List Homop., iii, p. 769, 1851.
Tettigonia communis Walk., List Homop., iv, p. 1156, 1852.
Helochara communis Sign., Ann. Soc. Ent. Fr., ser. 3, ii, p. 730, pl. 21, fig. 17, 1854.
Helochara communis Osb., Proc. Ia. Acad Sci., i, pt. 2, p. 125, 1892.
Helochara communis G. & B., Hemip. Colo., p. 82, 1895.
Helochara communis Ball, Proc. Ia. Acad. Sci., viii, p. 62, pl. 6, fig. 1, 1901.
Helochara communis Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 60, 1912.
Helochara communis Osb., Me. Agr. Exp. Sta., Bul. 238, p. 103, 1915.
Helochara communis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 24, 1916.
Helochara communis Van D., Cat. Hemip. N. A., p. 600, 1917.
Helochara communis Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 5, 1918.

Form: Rather small, robust species. Length, 4 to 7 mm. Vertex broader than long, slightly and obtusely pointed and with the elevated portions of front strongly elevated. Pronotum large and long, anterior margin broadly rounded, posterior margin distinctly emarginate. Scutellum short, overlapped by pronotum. Elytra coriaceous except at apex. Whole dorsal surface distinctly punctate.

Color: A green form. Head and anterior region of pronotum more yellowish. Front, including reflexed portion, with lateral brown arcs. In male, face black because of broadening and fusing of the arcs.

External genitalia: Female, last ventral segment over two-thirds as long as broad, lateral margins narrowed posteriorly, posterior margin incised on either side of the medially produced lobe; pygofers long and narrow, slightly exceeding ovipositor and bearing a few, coarse, short hairs on either side of the ovipositor. Male, valve short and broadly triangular; plates broad at base but tapering and prolonged acutely, exceeding the short pygofers.

Internal male genitalia: Styles with basal half gradually tapering, a large process on mesal margin for attachment to connective and posteriorly a large lateral bulge, the distal portion curved slightly outwardly, toothed on mesal margin and terminating rather truncately with a distinct outward point; connective T-shaped, the cross piece heavier than the standard; œdagus consisting of a pair of heavy dorsally directed processes and a pair of narrower, larger, sinuate and acutely pointed terminal processes.

Distribution: This species probably occurs throughout the eastern portion of the state, but hitherto has been reported only from Cherokee county.

Hosts: Found only on swamp grasses.

Genus GRAPHOCEPHALA Van D.

In this genus the head is narrower than the pronotum, the vertex is flat, obtusely rounding and with a distinct margin. The front is not inflated. The pronotum is narrowed anteriorly and with the posterior margin slightly emarginate. The elytra are long and coriaceous, venation obscured, and with rather long apical cells.

Two of the three United States' species have been taken in Kansas.

KEY TO SPECIES.

A. Large, 9 mm. or over, vertex unmarked. *coccinea.*
AA. Smaller, 6 mm. or under, vertex marked with black lines. *versuta.*

Graphocephala coccinea (Forst.).

(Pl. 8, figs. 3-4.)

Cicada coccinea Forst., Nov. Spec. Ins., p. 69, 1711.
Tettigonia quardivittata Say, Jl. Acad. Nat. Sci. Phila., vi, p. 312, 1831; Compl. Writ., ii, p. 386.
Tettigonia coccinea Harr., in Hitchcock, Geol. Mass., edn. 2, p. 580, 1835.
Proconia quadrivittata Fh., Homop. N. Y. St. Cab., p. 55, 1851.
Tettigonia picta Walk., List Homop., iii, p. 758, 1851.
Tettigonia quadrivittata Sign., Ann. Soc. Ent. Fr., ser. 3, ii, p. 348, pl. 11, fig. 11, 1854.
Aulacizes quadrivittata Fh., Trans. N. Y. St. Agr. Soc., xvi, p. 450, 1856.
Diedrocephala coccinea Uhl., Bul. U. S. Geol. Geog. Surv., i, p. 357, 1876.
Diedrocephala quadrivittata Glov., U. S. Dept. Agr., Rept. for 1876, p. 33.
Diedrocephala coccinea Van D., Can. Ent., xxi, p. 9, 1889.
Diedrocephala coccinea Osb., U. S. Dept. Agr., Div. Ent., Bul. 22, p. 28, 1890.
Diedrocephala coccinea Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 125, 1892.
Diedrocephala coccinea Ball, Proc. Ia. Acad. Sci., iv, p. 177, 1897.
Tettigonia quadrivittata Fowl., Biol. Centr. Am., Homop., ii, p. 276, 1900.
Tettigonia idonea Fowl., Biol. Centr. Am., Homop., ii, p. 276, 1900.
Diedrocephala coccinea Osb., 20th Rept. N. Y. St. Ent., p. 510, 1905.
Diedrocephala coccinea Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 60, 1912.
Diedrocephala coccinea Osb., Me. Agr. Exp. Sta., Bul. 238, p. 101, 1915.
Diedrocephala coccinea DeL., Tenn. St. Bd. Ent., Bul. 17, p. 25, 1916.
Diedrocephala coccinea Gibs., Can. Ent., xlviii, p. 178, 1916.
Graphocephala coccinea Van D., Cat. Hemip. N. A., p. 601, 1917.
Graphocephala coccinea Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 5, 1918.
Graphocephala coccinea Ols., Bul. Brooklyn Ent. Soc., xiii, p. 120, 1918.
Graphocephala coccinea Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 32, 1919.

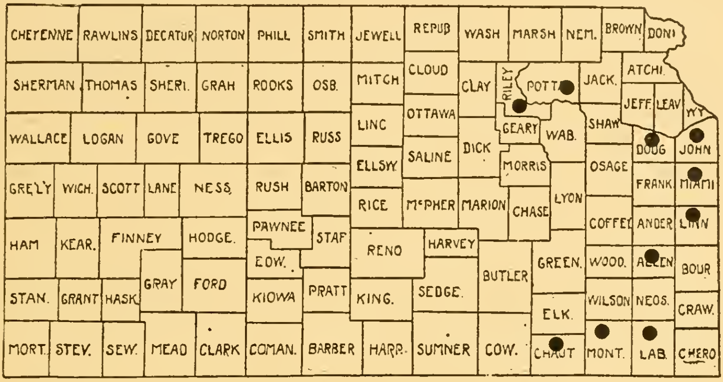
Form: A large, cylindric, elongated form. Length, 8 to 9 mm. Vertex, wider than long, two-thirds length of pronotum, roundingly acutely angled. Pronotum narrowed anteriorly with lateral and humeral angles about equal, posterior margin distinctly emarginate. Elytra long and narrow.

Color: Face yellow, separated from orange-yellow vertex by broad black line on margin. Vertex with two, small, black marginal lines before the ocelli, and frequently the posterior half reddish or green medially. Pronotum red with narrow light green band on anterior margin, and a posterior large dark green W, with outer arms turned mesad. Elytra red with costal, claval and sutural margins and median stripe on corium, green, the apex and appendix black.

External genitalia: Female, last ventral segment slightly longer than wide, lateral margins slightly narrowed posteriorly, posterior margins broadly rounded and medially produced; pygofers long and narrow, equalling ovipositor and bearing a few coarse hairs on either side of median line. Male, plates long, broad at base but apically greatly produced and concavely tapering to long acute tip, lateral margins bearing stiff hairs; pygofers long and narrow, greatly exceeding plates and covered with numerous coarse hairs.

Internal male genitalia: Styles tapering at anterior end, curved outward medially and ending in distinctly out-turned apices; connective slender, Y-shaped; œdagus with triangular body when viewed laterally, a long, slender process leaving it from near distal end, and a still longer, heavier one extending dorsad from the distal apex; a V-shaped chitinous bar at base of anal tube.

Distribution: Reports and specimens at hand seem to show this species as occurring only in eastern Kansas. It undoubtedly occurs further west in the state than is shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTT
JACK.
ATCHI.
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
SALINE
DICK
GEARY
WAB.
SHAW
DOUG
JOHN
ELLSW
GRELY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
MORRIS
OSAGE
FRANK
MIAMI
RICE
McPHER
MARION
CHASE
LYON
HAM
KEAR.
FINNEY
HODGE.
PAWNEE
STAF
RENO
HARVEY
COFFE
ANDER
LINN
EDW.
GREEN.
WOOD.
ALLEN
BOUR
STAN.
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
BUTLER
WILSON
NEOS.
ELK.
CRAW.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB.
CHERO

Hosts: Seemingly we have here a very general feeder. It has been taken from numerous weeds, shrubs and trees. The writer this season found the nymphs of the last instar in large numbers on *Ambrosia trifida* during the last week in July and the first week in August. By the last week in August the nymphs had all molted into adults.

Graphocephala versuta (Say).

Tettigonia versuta Say, Jl. Acad. Nat. Sci. Phila., vi, p. 311, 1831; Compl. Writ., ii, p. 386.

Tettigonia versuta Sign., Ann. Soc. Ent. Fr., ser. 3, p. 348, pl. 11, fig. 10, 1854.

Diedrocephala versuta Woodw., Bul. Ill. St. Lab. Nat. Hist., iii, p. 22, 1887.

Diedrocephala versuta Osb., U. S. Dept. Agr., Div. Ent., Bul. 22, p. 27, 1890.

Tettigonia redacta Fowl., Biol. Centr. Am., Homop., ii, p. 276, pl. 18, fig. 21, 1900.

Diedrocephala versuta Ball, Proc. Ia. Acad. Sci., viii, p. 64, pl. 6, fig. 3, 1901.

Diedrocephala versuta DeL., Tenn. St. Bd. Ent., Bul. 17, p. 25, 1916.

Diedrocephala versuta Gibs., Can. Ent., xlviii, p. 177, 1916.

Graphocephala versuta Van D., Cat. Hemip. N. A., p. 602, 1917.

Graphocephala versuta Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 5, 1918.

Graphocephala versuta Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 33, 1919.

Form: Like *coccinea* but smaller. Length, 5 to 6 mm. Vertex broader than long, a little shorter than pronotum, apex blunt, lateral margins distinctly rounding. Pronotum narrowed anteriorly, humeral margins slightly longer than lateral margins. Elytra not quite as long as in *coccinea.*

Color: Vertex with black marginal lines and with pair of median parallel lines connecting anteriorly with broken lines which run back parallel with the margin, between the margin and the ocelli. Space between parallel lines and around the margin whitish or yellowish, the rest reddish. Face yellow, pronotum yellowish anteriorly, greenish posteriorly, often with red bands continuous with red bands of clavus and of head, between which are blue bands. Scutellum red or yellowish with black markings. Elytra blue, claval suture with a blue stripe either side of which is a broader red one, apex and posterior third of costal margin pale with several small, dark, triangular spots.

External genitalia: Female, last ventral segment as long as broad, lateral margins strongly tapering posteriorly, the disc longitudinally elevated, posterior margin produced angularly; pygofers long and narrow, equalling or slightly exceeded by ovipositor, forming distinct keel on mesal margin, bearing a few short, coarse hairs. Male, plates long and narrow, often twice as long as the last ventral segment and bearing coarse hairs on the lateral margins; pygofers exceeded by the plates.

Distribution: Taken in Cherokee county.

Hosts: Gibson gives cowpeas and clover as hosts. De Long took specimens from shrubs and weeds. Probably a general feeder like the preceding.

Genus DRÆCULACEPHALA Ball.

The following is the original description of the genus: "Similar to *Diedrocephala*, the vertex usually longer and more acutely angled. Face, as seen from side, usually straight, or slightly concave to the middle of clypeus, where it is broken backwards. Disc of clypeus quite gibbous. Pronotum with the lateral margins parallel, narrower than or only equalling the eye. Elytra long, narrowing apically, greenish, the nervures raised, distinct, the apical and the ante-apical cells irregularly reticulate veined. Anterior tibiæ slender, round.

"Type of the genus *D. mollipes* Say."

Two members of this genus have been collected in Kansas. *D. noveboracensis* has not yet been reported in the state but likely occurs in the northeastern portion and is therefore included in the key. *D. reticulata* should be found in the southern part.

KEY TO SPECIES.*

A. Front, as seen from side, almost straight. Sides of front with dark arcs.
  B. Vertex long, acute, margins as seen from above straight, spots on apex minute or none. Profile of front straight.
    C. Size small, vertex of female distinctly longer than broad. Lines on vertex usually faint. Last ventral segment of male broad. *mollipes*

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* Adapted from key by Dr. E. D. Ball, Proc. Ia. Acad. Sci., viii, p. 67, 1901.

A. Front, as seen from side, almost straight—*concluded.*

CC. Size larger, vertex of female distinctly shorter than broad. Lines on vertex usually distinct and broad. Last ventral segment of male long, cylindrical. *angulifera.*

BB. Vertex shorter, roundingly acute, margins as seen from above slightly rounding, spots on apex distinct. Profile of front slightly rounding. *noveboracensis.*

AA. Front, as seen from side distinctly rounding. Sides of front mottled with brown or unmarked. *reticulata.*

Dræculacephala mollipes (Say).

(Pl. 9, figs. 6-7.)

Tettigonia mollipes Say, Jl. Acad. Nat. Sci. Phila., vi, p. 312, 1831; Compl. Writ., ii, p. 383.

Tettigonia mollipes Harr., in Hitchcock Geol. Mass., edn. 2, p. 580, 1835.

Aulacizes mollipes Fh., Homop. N. Y. St. Cab., p. 56, 1851.

Tettigonia innotata Walk., List Homop., iii, p. 770, 1851.

Tettigonia antica Walk., List. Homop., iii, p. 771, 1851.

Diedrocephala mollipes Sign., Ann. Soc. Ent. Fr., ser. 3, ii, p. 726, pl. 21, figs. 12, 13, 1854.

Acopsis viridis Prov., Nat. Can., iv, p. 352, 1872.

Diedrocephala mollipes Osb., Rept. Ia. St. Agr. Soc., for 1892, p. 687.

Tettigonia mollipes Fowl., Biol. Centr. Am., Homop., ii, p. 273, pl. 18, fig. 15, 1900.

Dræculacephala mollipes Ball, Proc. Ia. Acad. Sci., viii, p. 67, pl. 7, fig. 1, 1901.

Dræculacephala mollipes Osb., 20th Rept. N. Y. St. Ent., p. 511, 1905.

Dræculacephala mollipes Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 56, 1912.

Dræculacephala mollipes Osb., Me. Agr. Exp. Sta., Bul. 238, p. 103, 1915.

Dræculacephala mollipes Gibs., U. S. Dept. Agr., Div. Ent., Bul. 254, 1915.

Dræculacephala mollipes Van D., Ent. News, xxvi, p. 178, 1915.

Dræculacephala mollipes DeL., Tenn. St. Bd. Ent., Bul. 17, p. 27, 1916.

Dræculacephala mollipes Gibs., Can. Ent., xlviii, p. 177, 1916.

Dræculacephala mollipes Van D., Cat. Hemip. N. A., p. 603, 1917.

Dræculacephala mollipes Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 6, 1918.

Dræculacephala mollipes Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 37, 1919.

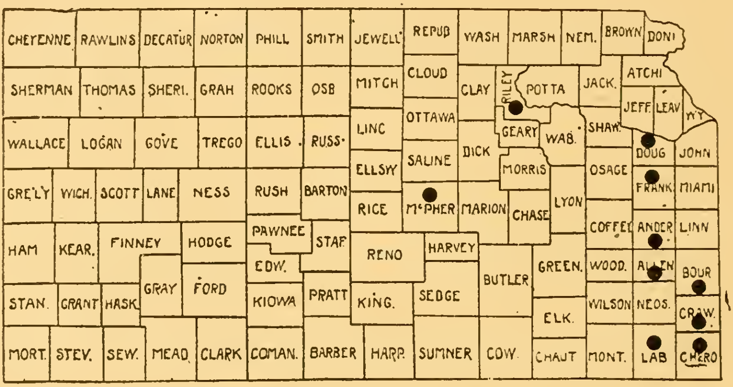
Form: Rather long and slender. Length, 6 to 9.5 mm. Vertex very long, acutely angled, sides straight, disc flat, longer in female than in male. Face straight in profile. Pronotum with lateral margins parallel, anterior margin rounding, posterior margin emarginate. Elytra long, nervures distinctly raised, apical portion reticulate.

Color: Vertex, anterior part of pronotum and scutellum yellow, latter two sometimes greenish. Vertex with two small apical spots, lines on reflexed portion of front, a median and a pair of lateral lines, brown. Face yellow to fuscous with nine pairs of brown arcs laterally. Disc of pronotum and elytra bright green, nervures light, costal and apical margins light.

External genitalia: Female, last ventral segment about two-thirds as long as broad, posterior margin sinuate on either side of obtusely rounded median lobe; pygofers long and narrow, equalling or exceeding ovipositor and bearing a few stout, coarse hairs along sutural margin. Male, valve short, angularly produced; plates large, as long as pygofers, and with short, stout hairs on margin.

Internal male genitalia: Styles with proximal portion large and scarcely tapering, large lobes for connection to connective, distal half first curving outward and then with a seeming terminal inwardly projecting segment which is toothed on the inner margin near the apex, and then curved outward at the extreme tip; connective T-shaped, with the cross bar heavy; œdagus consisting of a T-shaped heavy piece with a very short standard, from the sides of which extend out two long, tapering and twisting processes, the points of which extend laterad; a heavy characteristically shaped chitinous process extends downward from the base of the anal tube.

Distribution: Occurs throughout the eastern portion of the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS.
LINC
OTTAWA
GEARY
WAB.
SHAW.
DOUG
JOHN
SALINE
DICK
ELLSW
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK.
MIAMI
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF.
EDW.
RENO
HARVEY
COFFEY
ANDER
LINN
STAN.
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
BUTLER
GREEN.
WOOD.
ALLEN
BOUR
WILSON
NEOS.
ELK.
CRAW.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: This is a very general feeder, but because it occurs on so many cultivated crops, often in very large numbers, it is to be considered an insect of economic importance. The writer has taken it on corn, many native grasses and at lights. Gibson gives the following hosts: Wheat, barley, oats, alfalfa, Johnson grass, kafir corn, sorghum, cowpeas, Bermuda grasses and many native grasses. Osborn gives rye, bluegrass and brome grass as additional hosts. It is also known to feed on timothy.

Dræculacephala angulifera (Walk.).

Tettigonia angulifera Walk., List Homop., iii, p. 771, 1851.

Diedrocephala angulifera Sign., Ann. Soc. Ent. Fr., ser. 3, ii, p. 727, pl. 21, fig. 14, 1851.

Diedrocephala angulifera Van D., Ent. News, v, 156, 1894.

Dræculacephala angulifera Ball, Proc. Ia. Acad. Sci., viii, p. 69, pl. 7, fig. 4, 1901.

Dræculacephala angulifera Osb., 20th Rept. N. Y. St. Ent., p. 511, 1905.

Dræculacephala angulifera Van D., Ent. News, xxvi, p. 178, 1915.

Dræculacephala angulifera Osb., Me. Agr. Exp. Sta., Bul. 238, p. 102, 1915; Bul. 248, p. 78, 1916.

Dræculacephala angulifera Van D., Cat. Hemip. N. A., p. 603, 1917.

Dræculacephala angulifera Weiss, Ent. News, xxix, p. 310, 1918.

Dræculacephala angulifera Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 6, 1918.

Form: Larger and broader than preceding species. Length 8 to 11 mm. Vertex distinctly shorter than broad, disc concave anteriorly. Pronotum wide with long lateral margins. Elytra long, but broader than in *mollipes* though with similar venation.

Color: About as in *mollipes* except that the lines on the vertex are broad and distinct.

External genitalia: Female, last ventral segment about three-fourths as long as wide, lateral margins strongly tapering posteriorly, posterior margin strongly and angularly produced medially; pygofers very long and narrow, equalling or slightly exceeded by ovipositor, and bearing a very few coarse, stout hairs along either side of the ovipositor. Male, last ventral segment characteristic, distinctly longer than wide, cylindrical; valve semicircular, strongly and angularly produced medially; plates long and slender, slightly divergent, nearly equalling pygofers, tips curved upward and inward, and bearing a few hairs on lateral margins.

Distribution: Sedgwick county is the only place in the state from which specimens of this species have yet been taken.

Hosts: Doctor Osborn reports this species as occurring in the coarse grasses of lowlands and in timothy.

Dræculacephala noveboracensis (Fh.).

Aulacizes noveboracensis Fh., Homop. N. Y. St. Cab., p. 56, 1851.

Tettigonia prasina Walk., List Homop., iii, p. 768, 1851.

Tettingonia noveboracensis Walk., List Homop., iv, p. 1158, 1852.

Diedrocephala noveboracensis Sign., Ann. Soc. Ent. Fr., ser. 3, ii, p. 19, pl. 2, fig. 5, 1854.

Diedrocephala noveboracensis Osb., U. S. Dept. Agr., Div. Ent., Bul. 22, p. 27, 1890.

Diedrocephala noveboracensis Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 125, 1892.

Diedrocephala noveboracensis G. & B., Hemip. Colo., p. 82, 1895.

Diedrocephala noveboracensis O. & B., Proc. Ia. Acad. Sci., p. 177, 1897.

Dræculacephala noveboracensis Ball, Proc. Ia. Acad. Sci., viii, p. 71, pl. 7, fig. 6, 1901.

Dræculacephala noveboracensis Osb., 20th Rept. N. Y. St. Ent., 5, 511, 1905.

Dræculacephala noveboracensis Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 59, 1912.

Dræculacephala noveboracensis Osb., Me. Agr. Exp. Sta., Bul. 238, p. 101, 1915.

Dræculacephala noveboracensis Van D., Ent. News, xxvi, p. 179, 1915.

Dræculacephala noveboracensis Van D., Cat. Hemip. N. A., p. 605, 1917.

Dræculacephala noveboracensis Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 6, 1918.

Dræculacephala noveboracensis Weiss, Ent. News, xxix, p. 309, 1918.

Dræculacephala noveboracensis Ols., Bul. Brooklyn Ent. Soc., xiii, p. 121, 1918.

This species has not yet been reported from Kansas, but should be found in the eastern and northern portion. It is a rather large, stout species, 8 mm. long, with a shorter vertex than the preceding species. The vertex, when seen from above has slightly rounding margins, and the profile of the face is slightly rounding. It occurs, according to Osborn, on the coarse grasses of low ground.

Dræculacephala reticulata (Sign.).

(Pl. 9, figs. 8-9.)

Tettigonia reticulata Sign., Ann. Soc. Ent. Fr., ser. 3, p. 22, pl. 2, fig. 10, 1854.

Diedrocephala flaviceps Ril., Am. Ent., iii, p. 78, 1880.

Tettigonia flaviceps Johns. & Fox, Ent. News, iii, p. 60, 1892.

Tettigonia diducta Fowl., Biol. Centr. Am., Homop., ii, p. 274, pl. 18, fig. 17, 1900.
Dræculacephala reticulata Ball, Proc. Ia. Acad. Sci., viii, p. 73, pl. 6, fig. 8, 1901.
Dræculacephala reticulata Osb., Ohio Nat., ix, p. 463, 1909.
Dræculacephala reticulata Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 52, 1912.
Dræculacephala reticulata Van D., Ent. News, xxiv, p. 179, 1915.
Dræculacephala reticulata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 27, 1916.
Dræculacephala reticulata Van D., Cat. Hemip. N. A., p. 606, 1917.
Dræculacephala reticulata Ols., Bul. Am. Mus. Nat. Hist., xxxviii, p. 6, 1918.
Dræculacephala reticulata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 38, 1919.

Form: Smallest of the members of this genus that occur in the state. Length, 4.5 to 5 5 mm. Vertex blunt, much broader than long. Face in profile convex. Pronotum longer proportionally than in other members of the genus, humeral margins longer than lateral margins, posterior margin distinctly emarginate. Elytra characteristic because of the numerous apical reticulations.

Color: Face lacks the dark arcs characteristic of the three preceding species, being yellow or orange-yellow, as is the vertex, except for two light spots which include the ocelli. Anterior portion of pronotum and scutellum yellow. Disc of pronotum and scutellum grayish green with nervures and costal margin light.

External genitalia: Female, last ventral segment slightly wider than long, lateral margins slightly tapering posteriorly, posterior margin with median half roundingly produced; pygofers are long but rather stout, equalling the tip of the ovipositor and bearing a very few stout scattered hairs. Male, valve rounded on posterior margin; plates long, tapering regularly to acute tips from broad base, almost equalling pygofers.

Internal male genitalia: Styles of same type as in *mollipes*, but shorter and stouter; connective T-shaped, but with cross piece distinctly curved; œdagus much as in *mollipes* though smaller.

Distribution: Should be found in the southern part of the state.

Hosts: A general grass feeder. De Long reports it from Bermuda grass. It has been reported on oats and wheat.

Subfamily GYPONINÆ (Stal).

The members of this subfamily are for the most part large forms, having a broad, somewhat flattened body. Their flattened form, together with the fact that the ocelli are situated on the disc of the vertex, is enough to separate them from the other subfamilies. Three of the four United States genera are known to occur in Kansas.

KEY TO GENERA

A. Very short and broad, clavus truncate at tip. *Penthimia.*
AA. Elongate forms, clavus not truncate at tip.
  B. Head with sharp narrow margin, elytra oblique at apex. *Gypona.*
  BB. Head with broad flat margin, elytra perpendicular at apex. *Xerophloea.*

Genus PENTHIMIA Germ.

The members of this genus are short, ovate, Cercopid-like insects. The head is narrower than the pronotum, the vertex being very broadly rounded. Pronotum is widened posteriorly, distinctly transversely striated, and with the posterior margin broadly concave. The elytra, though exceeding the abdomen, are very short and broad and the broadly truncate apex of the clavus is very noticeable. There is a distinct appendix.

The single American species of this genus has been taken in Kansas.

Penthimia americana Fh.

Penthimia americana Fh., Homop. N. Y. St. Cab., p. 57, 1851.
Penthimia vicaria Walk., List Homop., iii, p. 841, 1851.
Penthimia picta Prov., Nat. Can., p. 352, 1872.
Penthimia americana G. & B., Hemip. Colo., p. 83, 1895.
Penthimia americana Osb., 20th Rept. N. Y. St. Ent., p. 514, 1905.
Penthimia americana Osb., Me. Agr. Exp. Sta., Bul. 238, p. 100, 1915.
Penthimia americana DeL., Tenn., St. Bd. Ent., Bul. 17, p. 29, 1916.
Penthimia americana Van D., Cat. Hemip. N. A., p. 610, 1917.
Penthimia americana Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 41, 1919.

Form: The above generic description gives the form of this species. Length, 5 to 6 mm.

Color: Varies from reddish-brown to black.

External genitalia: Female, last ventral segment long, posterior corners rounded, posterior margin slightly concave on either side of a median lobe which itself is slightly or sometimes distinctly emarginate, forming two teeth; pygofers very short and broad, slightly exceeded by ovipositor. Male, valve triangular; plates broad at base, tapering to acute apex, bearing fine hairs on margins, as long as very short pygofers.

Distribution: Taken only in Pottawatomie county.

Hosts: Osborn records this species as occurring on hickory, maple and other trees and shrubs. De Long reports it from oak.

Genus GYPONA Germ.

This genus contains some of our largest *Cicadellidæ.* They are more elongate than *Penthimia* and differ from *Xerophloea* in lacking the broad thin-margined head of the latter. The head is short and broadly rounded on the anterior margin. The pronotum has distinct lateral and humeral margins and is narrowed anteriorly. Its anterior margin is broadly rounded, while the posterior margin is broadly, though slightly, concave.

The five members of the genus listed below are known to occur in the state.

KEY TO SPECIES.

A. With longitudinal stripes on vertex, pronotum and scutellum. *octo-lineata.*

AA. No longitudinal stripes on vertex, pronotum and scutellum.
  B. Very broad species, green or black. *melanota.*
  BB. More slender species, gray or brown, usually spotted.
    C. Brownish species, veins not punctate laterally.
      D. Without submarginal spots on pronotum; not irrorate with red. *pectoralis.*
      DD. With four, anterior, submarginal spots on pronotum; often irrorate with red. *puncticollis.*
    CC. Grayish species, veins distinctly punctate laterally. *cinerea.*

Gypona octo-lineata (Say).

(Pl. 10, figs. 1-2.)

Tettigonia octo-lineata Say, Jl. Acad. Nat. Sci. Phila., iv, p. 340, 1824; Compl. Writ., ii, p. 257.
Gypona striata Burm., Genera Ins., i, pl. 16, No. 9, 1838.
Gypona cana Burm., Genera Ins., i, pl. 16, No. 10, 1838.
Gypona flavilineata Fh., Homop. N. Y. St. Cab., p. 57, 1851.
Gypona quebecensis Prov., Nat. Can., iv, p. 352, 1872.
Gypona flavilineata Spangb., Spec. Gyponæ, p. 8, 1878.
Gypona scrupulosa Spangb., Spec. Gyponæ, p. 9, 1878.
Gypona olivacea Spangb., Ent. Tidskr., p. 24, 1881.
Gypona octo-lineata Uhl., Stand. Nat. Hist., ii, p. 247, 1884.
Gypona octo-lineata Van D., Psyche, v, p. 390, 1890.
Gypona octo-lineata O. & B., Proc. Ia. Acad. Sci., iv, p. 179, 1897 (part).
Gypona octo-lineata Osb., 20th Rept. N. Y. St. Ent., p. 512, 1905.
Gypona flavilineata Osb., Me. Agr. Exp. Sta., Bul. 238, p. 105, 1915.
Gypona octo-lineata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 31, 1916.
Gypona octo-lineata Van D., Cat. Hemip. N. A., p. 611, 1917.
Gypona octo-lineata Gibs., Proc. U. S. Natl. Mus., lvi, p. 90, 1919.
Gypona octo-lineata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 41, 1919.

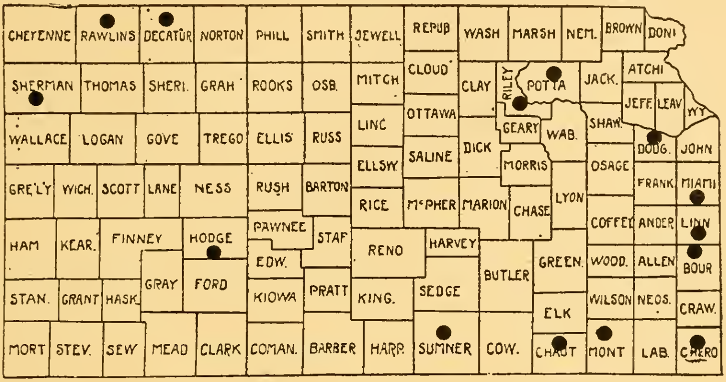
Form: A large oval species. Length, 7 to 10 mm. Vertex broadly rounded, thin-margined, over half as long as basal width. Pronotum characteristic of the genus, narrowed anteriorly, anterior margin broadly though slightly convex, posterior margin about equally concave, lateral margins long, humeral margins shorter. Scutellum large. Elytra long, tapering posteriorly, sometimes reticulately veined, including the clavus.

Color: Light green usually, often darker. Vertex with six yellowish or red longitudinal lines, pronotum with eight, scutellum with four. Nervures of elytra varying from yellow to red. The red stripes and veins give the brightly-colored forms a distinct reddish look.

External genitalia: Female, last ventral segment longer than preceding segment, narrowed posteriorly, longest laterally partially due to posterior margin being turned downward and forming a broad, rounded, median excision extending a third of the distance to the base; pygofers broad and long, exceeding ovipositor, bearing a few stout hairs on apical third. Male, last ventral segment very long, slightly notched medially, concealing valve; plates long and narrow, longer than last ventral segment, widely separated at base, overlapping apically, nearly or quite equalling the short pygofers.

Internal male genitalia: Styles very large, thickest just beyond the middle, apical third bent laterad, terminating in a foot-like form, toothed on inner margin apically; connective broad and stout, with a short stout median process to œdagus; œdagus V-shaped, very heavy basally, terminal portion tapering, long and slender, terminating bluntly and bearing near apex a pair of long, slender lateral processes.

Distribution: Our commonest member of the genus. Is found all over the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW.
DOUG.
JOHN
DICK
SALINE
ELLSW
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK.
MIAMI
COFFEY
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
EDW.
BUTLER
GREEN.
WOOD.
ALLEN
BOUR
STAN.
GRANT
HASK.
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS.
ELK
CRAW.
MORT
STEV.
SEW
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT
LAB.
CHERO

Hosts: Occurs on a great variety of weeds, grasses, shrubs and trees. The writer has observed the nymphs very commonly on *Carya ovata* around Lawrence.

Gypona melanota Spangb.

Gypona melanota Spangb., Spec. Gyponæ, p. 19, 1878.
Gypona bipunctulata Woodw., Bul. Ill. St. Lab. Nat. Hist., iii, p. 30, 1887.
Gypona nigra Woodw., Bul. Ill. St. Lab. Nat. Hist., iii, p. 31, 1887.
Gypona bipunctulata O. & B., Proc. Ia. Acad. Sci., iv, p. 181, 1897.
Gypona melanota Van D., Trans. Am. Ent. Soc., xxix, p. 112, 1903.
Gypona melanota Van D., 20th Rept. N. Y. St. Ent., p. 513, 1905.
Gypona bipunctulata Osb., 20th Rept. N. Y. St. Ent., p. 513, 1905.
Gypona melanota Smith, Cat. Ins. N. J., end. 3, p. 101, 1910.
Gypona melanota Van D., Cat. Hemip. N. A., p. 613, 1917.
Gypona melanota Gibs., Proc. U. S. Natl. Mus., lvi, p. 95, 1919.
Gypona bipunctulata Gibs., Proc. U. S. Natl. Mus., lvi, p. 98, 1919.

Form: This species is the most robust looking of the members of this genus, being very broad and flat in proportion to its length. Length of female, 9 to 11 mm.; male, 8.25 mm. Vertex, about twice as long medially as next to the eye, anterior margin broadly rounding, slightly concave preapically, the oblique striations very distinct. Pronotum about twice as long as vertex, distinctly transversely striated. Elytra very broad, slightly exceeding abdomen.

Color: The females are all greenish, frequently bearing a pair of black spots laterally on the pronotum not quite half way back, and a black spot on base of each elytron, just under outer edge of pronotum. The males may be of the same color as the females, or they may be black forms. In the latter, the vertex may be partly or entirely black except for light marks around the ocelli, a pair of light spots on the posterior margin a little further apart than the ocelli and another pair of light spots near the anterior margin a little in front of the eyes. The pronotum may have the disc blackened, showing the pair of black dots, or it may be entirely black except for a strip of light along the lateral margins. The scutellum may have the disc blackened, or it may be entirely black except for touches of light markings near the apex. The elytra are very smoky, but are usually light and hyaline enough to let the black abdomen show through, showing the black spot at the base, as in the female.

External genitalia: Female, last ventral segment long, longest at lateral angles, shortest medially, posterior margin broadly concave with a very small median lobe; pygofers broad and long, slightly exceeding ovipositor and bearing, especially on apical half, a few coarse hairs. Male, valve hidden by last ventral segment; plates broad, obliquely truncate and overlapping apically, exceeded by the large pygofers which bear a few stout hairs laterally.

Distribution: Specimens have been taken in Pottawatomie and Douglas counties.

Hosts: Seemingly confined to native grasses.

In 1905 Professor Osborn suggested that *G. melanota* Spangb. might be a melanotic form of *G. bipunctulata* Woodw. Dr. Ball is of the opinion that such is the case and in his collection are to be seen the large females and the smaller males of both colors. Many of these were taken together, so there seems to be no doubt as to the synonomy of these two forms.

Gypona pectoralis Spangb.

Gypona pectoralis Spangb., Spec. Gyponae. p. 16, 1878.
Gypona pectoralis Spangb., Ent. Tidskr., i, p. 33, 1881.
Gypona albimarginata Woodw., Bul. Ill. St. Lab. Nat. Hist., iii, p. 31, 1887.
Gypona hullensis Prov., Pet. Faune Ent. Can., iii, p. 269, 1889.
Gypona pectoralis Wirtn., Ann. Carn. Mus., iii, p. 220, 1904.
Gypona pectoralis Van D., Ottawa Nat., xxvi, p. 68, 1912.
Gypona pectoralis Van D., Cat. Hemip. N. A., p. 614, 1917.
Gypona pectoralis Gibs., Proc. U. S. Natl. Mus., lvi, p. 91, 1919.

Form: Not as broad as preceding species. Length, 8.5 to 10.24 mm. Vertex less than twice as long medially as next to the eye, broadly rounded. Pronotum characteristic of the genus. Elytra long, well exceeding the abdomen, subcoriaceous.

Color: Brownish; vertex and pronotum having a mottled appearance as does anterior portion of scutellum. Posterior portion of scutellum lighter. Elytra darker than other parts, often having large or small dark spots on the cross veins and sometimes on the cells.

External genitalia: Female, last ventral segment broad, slightly longer than preceding segment, posterior margin truncate, with a small median excision; pygofers broad and long, exceeding ovipositor, and bearing, chiefly on distal half, quite a few large coarse hairs. Male, last ventral segment long, semicircular, covering the valve; plates very broad and obliquely truncate apically with the outer angles more prominent than the rounding inner angles; pygofers about as long as the plates, narrow, and covered with numerous very large hairs.

Distribution: Taken in Douglas, Pottawatomie, Sumner and Montgomery counties.

Hosts: Probably a grass-feeding species.

Gypona puncticollis Spangb.

Gypona puncticollis Spangb., Spec. Gyponæ, p. 54, 1878.
Gypona puncticollis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 30, 1916.
Gypona puncticollis Van D., Cat. Hemip. N. A., p. 615, 1917.
Gypona puncticollis Gibs., Proc. U. S. Natl. Mus., lvi, p. 98, 1919.

Form: As in preceding species. Length, 8 to 9 mm.

Color: Reddish brown with vertex, pronotum and scutellum lighter than the elytra, the scutellum the lightest. Head, pronotum and basal and costal portion of elytra often irrorate with red. Spot behind each ocellus light brown. Pronotum with four black spots near the margin. Elytra with black spot on humerus, on some of the cross veins and also in some cells.

External genitalia: Female, last ventral segment broad and long, posterior margin sinuate, lobe on median third with a median notch; pygofers broad and long, exceeding ovipositor and with coarse hairs on apical half. Male, genitalia as in preceding species except that last ventral segment is more produced medially and the plates are longer and further apart.

Distribution: Taken only in Pottawatomie and Riley counties.

Hosts: De Long gives *Elymus virginicus* as one of the grass hosts of this species.

Gypona cinerea Uhl.

Gypona cinerea Uhl., Bul. U. S. Geol. Geog. Surv., iii, p. 460, 1877.
Gypona cinerea Woodw., Bul. Ill. St. Lab. Nat. Hist., iii, p. 32, 1887.
Gypona cinerea Will., Kan. Univ. Sci. Bul., viii, p. 223, 1913.
Gypona cinerea Van D., Cat. Hemip. N. A., p. 615, 1917.
Gypona cinerea Gibs., Proc. U. S. Natl. Mus., lvi, p. 100, 1919.

Form: This species varies very greatly in size. Length of females 6 to 11 mm., males 5 to 9 mm. Vertex produced more than in other members of the genus, about three times as long medially as next the eyes and almost as long as the pronotum. Pronotum twice as broad as long. There are long- and short-winged forms in both sexes. In the long-winged females the elytra just exceed the abdomen; in the short-winged forms they are exceeded by the abdomen. The elytra of the long-winged males greatly exceed the abdomen, whereas in the short-winged males the elytra are shorter than the abdomen. In any case the elytra are quite broad.

Color: The color varies from a light, brownish-gray to a dark cinerous. Vertex and pronotum densely punctate with black. Vertex with pair of black spots on posterior margin, a little further apart than the ocelli. Pronotum often with series of anterior, submarginal dark spots. Scutellum slightly punctate with fuscous, the basal angles dark. Elytra very characteristically marked with fuscous, with impressed punctures on either side of the nervures, and frequently having small fuscous spots in the cells. Head, pronotum and scutellum sometimes lightly irrorate with red.

External genitalia: Female, last ventral segment longer than preceding, posterior margin with a large excavation, reaching one-third of the distance to the base, the base of which bears a distinct, obtusely-pointed or rounded lobe; pygofers are broad and long, exceeding the ovipositor, broadest at the middle, each bearing preapically a lateral, black, impressed line. In the long-winged male the last ventral segment is somewhat longer than the preceding one and the posterior margin is slightly concave and elevated; plates are long and narrow, overlapping apically, about equalling the ovipositors which bear a few stout hairs on apical half. In the short-winged male, the plates seem to be further covered by a relatively longer last ventral segment, so that they appear shorter. In the specimens examined they were not found to overlap apically.

Distribution: Taken in Grant and Pottawatomie counties.

Hosts: Williams records this species as common on Buffalo grass in Kansas.

Genus XEROPHLŒA Germ.

The members of this genus differ from the other members of the *Gyponinæ* in having a much flatter head, with broad thin margins. They also have the apices of the elytra perpendicular in position rather than in the more horizontal position characteristic of the other genera.

One of the two United States' species has been taken in the state.

Xerophlœa viridis (Fabr.).

(Pl. 10, figs. 5-6.)

Cercopis viridis Fabr., Ent. Syst., iv, p. 50, 1794.
Xerophlœa grisea Germ., Zeits. f. Ent., i, p. 190, 1839.
Xerophlœa virescens Stal, Of. Vet. Akad. Forh., xi, p. 253, 1854.
Xerophlœa viridis Stal, Hemip. Fabr., ii, p. 59, 1869.
Parapholis peltata Uhl., Bul. U. S. Geol. Geog. Surv., iii, 461, 1877.
Xerophlœa peltata G. & B., Hemip. Colo., p. 82, 1895.
Xerophlœa viridis O. & B., Proc. Ia. Acad. Sci., iv, p. 179, pl. 19, fig. 1, 1897.
Xerophlœa viridis Osb., 20th Rept. N. Y. St. Ent., p. 512, 1905.
Xerophlœa viridis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 28, 1916.
Xerophlœa viridis Van D., Cat. Hemip. N. A., p. 616, 1917.
Xerophlœa viridis Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 40, 1919.

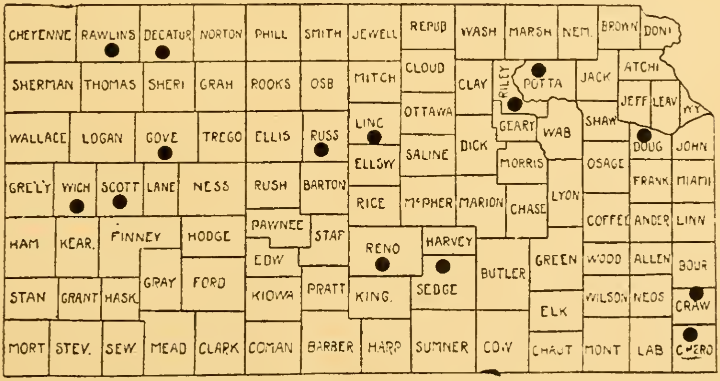
Form: Wedge-shaped, robust. Length, 6 to 7.25 mm. Head very flat and thin, narrower than pronotum. Vertex about twice as broad as long, obtusely angular apically. Pronotum broadest at posterior lateral angles, humeral margins longer than the lateral margins, sinuate, roundingly angled with the posterior emarginate margin, anterior margin quite convex. Apex of scutellum long and acute. Elytra broad and long, much exceeding abdomen and perpendicular apically. Entire dorsal surface coarsely and deeply pitted.

Color: Female bright green, elytra faded apically. Occasionally a female will be very light green, very irregularly mottled all over with dark brown, giving her a brownish rather than a greenish color. Males are usually a dirty yellowish-green. The vertex bears a broad brown median stripe which extends on to the pronotum and makes the disc and posterior margin brown. Elytra with a brown spot before the clavus and often with a series of smaller spots along sutural margin to the apex.

External genitalia: Female, last ventral segment very long, as long as wide, and incised medially clear to the base, forming two large approximate lobes; pygofers are broad and long, slightly exceeded by ovipositor, and bearing short appressed hairs. Male, last ventral segment long, posterior margin somewhat convex, hiding the valve; plates very long and narrow, pointed apically, exceeding the short pygofers.

Internal male genitalia: Styles large and very characteristic, basal half club-shaped, then suddenly narrowed and gradually thickening to a broad truncate apex with a distinct inner acutely pointed angle, the outer angle being rounded; the connective is broad basally, tapering sinuately to the apex; the œdagus has a small basal, dorsally directed process followed by a sharp constriction, and terminates in a bluntly pointed process, which, viewed laterally, appears triangular.

Distribution: A common form found throughout the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GRELY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
BUTLER
GREEN
WOOD
ALLEN
BOUR
EDW
GRAY
FORD
STAN
GRANT
HASK
KIOWA
PRATT
KING.
SEDGE
ELK
WILSON
NEOS
CRAW
MORT
STEV.
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: A grass feeding species. De Long records it as especially abundant on *Aristida gracilis*.

Subfamily JASSINÆ (A. & S.).

In this subfamily are included a great variety of forms and more than three times as many species as in the preceding subfamilies combined. It is rather hard to give distinct characteristics for the group for it contains a very heterogeneous mass of species. The members of one of its tribes frequently lack ocelli, a condition not found in the other subfamilies. In the other tribes the ocelli are on or very near the margin of the vertex and thus these two tribes differ from the members of the other subfamilies where the ocelli are either on the front, below the margin of the vertex, or on the disc of the vertex, above the margin.

KEY TO THE TRIBES.

A. Ocelli either just above margin of vertex or distant from the eyes. *Acucephalini.*
AA. Ocelli, if present, on margin of vertex and not distant from the eyes.
  B. Nervures of elytra branching on disc. *Jassini.*
  BB. Nervures of elytra not branching on disc. *Typhlocybini.*

Tribe ACUCEPHALINI (Dohrn).

The members of this tribe are in the main broad, robust forms in which the ocelli are either situated just above the margin of the vertex, or on the margin, but much further from the eyes than is normally their situation for the members of the tribe *Jassini.*

KEY TO GENERA.

A. Head flattened, vertex long, distinctly angled apically. *Memnonia.*
AA. Head conical, vertex shorter, rounded apically.
  B. Head moderately long, pronotum not produced beyond anterior margin of eyes. *Xestocephalus.*
  BB. Head short, pronotum produced beyond anterior margin of eyes. *Nionia.*

Genus MEMNONIA Ball.

The following is the original description of the genus: "General form of *Acucephalus,* vertex convex, sloping, nearly right angled, about half as long as the width across the eyes, the anterior margin thick, ocelli on the margin above the frontal sutures, distant from the eyes; face convex, forming an acute angle with the vertex, front above broad, narrowing below and abruptly rounding to the parallel margined clypeus; pronotum as long or longer than vertex, strongly, transversely wrinkled, the lateral margins less than half the middle length, anterior and posterior margins nearly parallel; elytra *macropterous*, covering the abdomen in the male and all but the ovipositor in the female, with long apical cells and a narrow appendix, or *brachypterous*, covering about two-thirds of the abdomen, the apical cells very small; under wings rudimentary; venation, the inner branch of the first sector tied to the second sector near its origin, again forking near the middle, its outer form tied to the outer branch beyond its middle, anteapical cells of very different lengths."

One of the two American forms has been taken in Kansas, but both are likely to be found.

KEY TO SPECIES.

A. Females larger, 4 mm. or more, greenish-brown, ovipositor well exserted; males 3 mm. long, black. *consobrina.*

AA. Females smaller, 3.5 mm. or less, creamy buff, ovipositor shorter, male similar to female in size and color. *fraterna.*

Memnonia consobrina Ball.

Memnonia consobrina Ball, Rept. Ia. Acad. Sci. for 1899, p. 66, pl. 5, figs. 6-10, 1900.
Memnonia consobrina Van D., Cat. Hemip. N. A., p. 621, 1917.

Form: Females larger than males. Former robust, widest at beginning of posterior half. Length, 4 to 4.25 mm. Males smaller. Length, 3 mm. Vertex twice longer on middle than against eyes, more pointed in males. Pronotum twice wider than long. Elytra covering the abdomen in the males and in some females, leaving part of abdomen exposed in other females.

Color: Females, vertex, pronotum and scutellum yellowish-green, elytra brownish. Males black with white spots in a row across the anteapical cells.

External genitalia: Female, last ventral segment nearly three times as long as preceding, posterior margin emarginate, with a distinct median lobe; pygofers tapering greatly caudad and much exceeded by the ovipositor which bears a few hairs apically. Male, valve small, triangular, plates together about half as wide as ultimate segment, long, tapering to acute tip; pygofers slightly exceeding plates, bearing large coarse hairs on margins.

Distribution: Has not yet been taken in the state.

Hosts: Ball reports this species as breeding on *Schedonnardus texanus* and *Muhlenbergia gracillima.*

Memnonia fraterna Ball.

Memnonia fraterna Ball, Rept. Ia. Acad. Sci. for 1899, p. 67, 1900.
Memnonia fraterna Van D., Cat. Hemip. N. A., p. 621, 1917.

Form: Smaller than *consobrina*, all forms brachypterous. Length, 3 to 3.5 mm. Vertex about two-thirds as long as basal width, pronotum of about the same length. Elytra broad and short, exposing last abdominal segment and pygofers.

Color: Creamy buff, seemingly covered with a whitish bloom; apical nervures and posterior margin of abdominal segments fuscous.

External genitalia: Female, last ventral segment slightly larger than in *consobrina;* ovipositor usually but slightly exceeding the posteriorly tapered pygofers. Male, valve small, triangular, plates similar to *consobrina* but shorter, much exceeded by the stout pygofers which bear a few stout spines on the apical half.

Distribution: Taken only in Reno county.

Hosts: Doctor Ball reports this species on the same plants as *consobrina.*

Genus XESTOCEPHALUS Van D.

The members of this genus are ovate in form with the head narrower than the pronotum, subconical, the vertex sloping, and with the ocelli on the rounded anterior margin of the head, distant from the eyes. Pronotum narrow, over twice as wide as long, anterior and posterior margins about parallel and with distinct lateral and humeral margins. Scutellum large, nearly as long as the pronotum. Elytra almost coriaceous, long, greatly exceeding the abdomen.

Two of the three species of this genus which likely occur in Kansas have been collected in the state.

KEY TO SPECIES.

A. Vertex marked with distinct yellow lines. *pulicarius.*
AA. Vertex without distinct yellow lines.
  B. Vertex practically unicolorous. *superbus.*
  BB. Vertex irrorate, brown and yellow. *tessellatus.*

Xestocephalus pulicarius Van D.

Xestocephalus pulicarius Van D., Bul. Buf. Soc. Nat. Sci., v, pp. 197, 215, 1894.
Xestocephalus pulicarius O. & B., Proc. Ia. Acad. Sci., iv, p. 284, 1897.
Xestocephalus pulicarius Osb., 20th Rept. N. Y. St. Ent., p. 515, 1905.
Xestocephalus pulicarius Osb., Me. Agr. Exp. Sta., Bul. 238, p. 109, 1915.
Xestocephalus pulicarius DeL., Tenn. St. Bd. Ent., Bul. 17, p. 35, 1916.
Xestocephalus pulicarius Van D., Cat. Hemip. N. A., p. 621, 1917.
Xestocephalus pulicarius Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 46, 1919.

Form: The smallest of the three species mentioned. Length, 2.5 to 3 mm. Head subconical, vertex rounded, more than twice as broad as long. Pronotum twice as broad as long, half longer than vertex. Elytra large, broad and very long, greatly exceeding abdomen.

Color: Brown, marked with yellow. Vertex with yellow spots on apex and next each eye, latter connected by an m-shaped line on the disc of the vertex, posterior margin yellow. Pronotum with four yellow anterior submarginal spots and scattered spots on disc. Scutellum with two anterior median yellow spots. Elytra with many yellow spots of various sizes.

External genitalia: Female, last ventral segment over twice as long as preceding one, with posterior margin broadly though shallowly emarginate; pygofers broad but short, bearing only coarse spines, especially on apical half, exceeded by the ovipositor. Male, last ventral segment longer laterally than medially; valve very small; plates about twice as long as last ventral segment, broad basally, tapering apically to obtuse apices, bearing many long fine hairs and a few stout spines, slightly exceeded by the pygofers.

Distribution: This species has been taken in Cherokee, Douglas, Pottawatomie and Hodgeman counties.

Hosts: Van Duzee reports this species from swampy pastures where *Carex vulpinoidea* abounds. De Long reports it on grasses throughout Tennessee.

Xestocephalus superbus (Prov.)

Deltocephalus superbus Prov., Pet. Faune Ent. Can., iii, p. 339, 1890.
Xestocephalus fulvocapitatus Van D., Bul. Buf. Soc. Nat. Sci., v, pp. 197, 215, 1894.
Xestocephalus fulvocapitatus Osb., 20th Rept. N. Y. St. Ent., p. 515, 1905.
Xestocephalus superbus Van D., Can. Ent., xliv, p. 329, 1912.
Xestocephalus fulvocapitatus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 109, 1915.
Xestocephalus fulvocapitatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 35, 1916.
Xestocephalus superbus Van D., Cat. Hemip. N. A., p. 622, 1917.

Form: Larger and more robust than *pulicarius*. Length of female, 3.5 mm., length of male, 2.25 mm. or more. Otherwise like *pulicarius*.

Color: Head, pronotum and scutellum almost unicolorously brown. Elytra distinctly marked with semi-transparent spots on corium and apically, latter more or less coalescent.

Genitalia: As in *pulicarius*.

Distribution: Taken in Douglas and Pottawatomie counties.

Hosts: This is also reported as living on *Carex*.

Xestocephalus tessellatus Van D.

Xestocephalus tessellatus Van D., Bul. Buf. Soc. Nat. Sci., v, p. 216, 1894.
Xestocephalus tessellatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 35. 1916.
Xestocephalus tessellatus Van D., Cat. Hemip. N. A., p. 622, 1917.
Xestocephalus tessellatus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 47, 1919.

Form: The largest of the species of this genus that should occur in Kansas. Length, 4 mm. Otherwise form of preceding species.

Color: Vertex and pronotum brown, irrorate with white. Scutellum with basal angles dark. Elytra with nervures alternating brown and white and with two large brown spots on costal margin and five large apical spots.

External genitalia: Female, last ventral segment with posterior margin slightly concave and slightly notched medially. Male, valve hidden by last ventral segment; plates strongly narrowed from near the base to a slender point.

Distribution: Not yet reported from this state.

Hosts: Gibson and Cogan report taking specimens from elm leaves.

Genus NIONIA Ball.

In this genus the vertex is very short, produced medially till twice as long as next the eye. Ocelli distant from eyes. Pronotum long, anterior margin produced beyond anterior margin of eyes, posterior margin emarginated medially, coarsely punctured. Elytra moderately long, slightly exceeding abdomen, veins margined with lines of coarse deep punctures.

Nionia palmeri (Van D.).

Goniagnathus palmeri Van D., Can. Ent., xxiii, p. 171, 1891.
Goniagnathus palmeri Osb., 20th Rept. N. Y. St. Ent., p. 529, 1905.
Goniagnathus palmeri Osb., Ohio Nat., v, p. 274, 1905.
Nionia palmeri Ball, Proc. Biol. Soc. Wash., xxviii, p. 166, 1915.
Goniagnathus palmeri DeL., Tenn. St. Bd. Ent., Bul. 17, p. 33, 1916.
Nionia palmeri Van D., Cat. Hemip. N. A., p. 622, 1917.
Nionia palmeri Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 46, 1919.

Form: Much like a *Macropsis* in general appearance but stouter. Length, 4 mm. Vertex very short except medially where it is produced till twice as long as next the eye. Pronotum with anterior margin greatly produced, reaching far beyond anterior margin of eyes, lateral margins practically none, posterior margin emarginate. Scutellum large, about as long as wide, punctate. Elytra broad and moderately long, nervures margined with coarse punctures.

Color: Shining black except for brownish apices of elytra, antennæ and tarsi.

External genitalia: Female, last ventral segment twice as long as preceding, posterior margin slightly produced medially; pygofers broad and short, exceeded by the ovipositor. Male, valve covered by last ventral segment, plates tapering to acute apices.

Distribution: Reported from Cherokee, Pottawatomie and Riley counties.

Hosts: Definite host unknown.

Tribe JASSINI (Dohrn).

This is a very heterogeneous tribe, but all its members have the ocelli on the margin of the vertex near the eyes, and the nervures of the elytra branch on the disc.

Of the 34 genera of the tribe known to occur in America north of Mexico, we have 24 genera in Kansas.

KEY TO GENERA.

- A. Head flattened, anterior margin thin, sharp, or foliaceous.
  - B. Head, at least in female, strongly foliaceous.
    - C. Head about twice as long as width across the eyes; head of both male and female foliaceous. *Dorycephalus*
    - CC. Head about as long as width across the eyes; head of male distinctly less foliaceous than head of female.

A. Head flattened—*concluded.*

D. Species unstriped or with longitudinal yellow stripes on vertex and pronotum; females brachypterous. *Hecalus.*

DD. Species with converging red lines on vertex and pronotum, both sexes macropterous. *Spangbergiella.*

BB. Head thin but not foliaceous.

C. Greenish species, elytra not ramosely pigmented. *Parabolocratus.*

CC. Brownish species, elytra more or less ramosely pigmented. *Dicyphonia.*

AA. Head not flattened, anterior margin neither sharp nor foliaceous.

B. Vertex longer than wide or not much wider than long, disc flattened, separated from front by more or less of a distinct margin.

C. Elytra with three anteapical cells.

D. One cross vein between sectors of elytra. *Scaphoideus.*

DD. Usually two cross veins between the sectors of elytra.

E. Vertex greatly produced and acutely angled, front long and narrow. *Platymetopius.*

EE. Vertex moderately produced, front broad, clypeus narrowed at tip. *Deltocephalus.*

CC. Elytra with two anteapical cells. *Lonatura.*

BB. Vertex usually much wider than long, disc sloping and margin rounding to front.

C. Inner sector of elytra twice forked, elytra with three anteapical cells.

D. Inner branch of first sector forking on disc of corium.

E. Elytra usually short, seldom longer than abdomen, often very short, vertex large.

F. Ovipositor long, exceeding pygofers.

G. Gray, or with golden iridescence. *Aconura.*

GG. Black or dark species. *Driotura.*

FF. Ovipositor short, seldom exceeding pygofers. *Euscelis.*

EE. Elytra longer, usually distinctly exceeding abdomen; vertex smaller.

F. Elytra marked with fine ramose pigment lines, or, if not, with transverse furrow on vertex.

G. Ramose lines, if present, restricted to a cross band behind middle of elytra.

H. Elytra with one cross nervure between sectors. *Eutettix.*

AA. Head not flattened—*concluded.*

- HH. Elytra with two cross nervures between the sectors or supernumerary veinlets to costa or both.
  - I. Anterior margin of vertex rounding to front, no black line under vertex. *Aligia.*
  - II. Anterior margin of vertex acutely angled with front, black line under vertex. *Mesamia.*
- GG. Ramose lines always present, not restricted to transverse band. *Phlepsius.*
- FF. Elytra not marked with ramose pigment lines.
  - G. Elytra with apex pointed. *Acinopterus.*
  - GG. Elytra with apex rounded.
    - H. Vertex usually distinctly longer medially than next the eye, sides of pronotum short; species usually slender. *Thamnotettix*
    - HH. Vertex usually not much longer medially than next the eye, sides of pronotum longer; species usually broad and green. *Chlorotettix.*
- DD. Inner branch of first sector not forked on disc of corium.
  - E. Vertex not produced, scutellum very large. *Jassus.*
  - EE. Vertex well produced, scutellum smaller. *Neocœlidia.*
- CC. Inner sector of elytra not forked, elytra with two anteapical cells.
  - D. Wing with 3 apical cells. *Cicadula.*
  - DD. Wing with 2 apical cells.
    - E. Head narrower than pronotum. *Balclutha.*
    - EE. Head wider than pronotum. *Eugnathodus.*

Genus DORYCEPHALUS Kirsch.

This genus is at once characterized by the unusually prolonged foliaceous vertex. They are grayish or brownish, sticklike insects, especially the brachypterous forms.

Both the North American species occur in Kansas.

KEY TO SPECIES.

A. Head broadly foliaceous, elytra more than half the length of the abdomen in both sexes. *platyrhynchus.*

AA. Head narrowly foliaceous, elytra less than half the length of the abdomen in both sexes. *vanduzei.*

Dorycephalus platyrhynchus Osb.

Dorycephalus sp., Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 127, 1892.

Dorycephalus platyrhynchus Osb., Can. Ent., xxvi, p. 216, 1894.

Dorycephalus platyrhynchus O. & B., Proc. Ia. Acad. Sci., p. 185, pl. 20, fig. 1, 1897.

Dorycephalus platyrhynchus Ball, Ia. Acad. Sci., for 1899, p. 68, 1900.

Dorycephalus platyrhynchus Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 65, fig. 7, 1912.

Dorycephalus platyrhynchus Van D., Cat. Hemip. N. A., p. 623, 1917.

Form: Long forms, characterized by the very broad, flat head. Length, female, 14.5 mm.; male, 9 mm. Female, vertex about twice as long as width across eyes, very flat and with a longitudinal median carina. Pro thorax more than twice as broad as long, with five elevated longitudinal ridges, anterior margin sinuate, lateral margins long and parallel, posterior margin emarginate medially. Elytra strongly veined, extending to fourth abdominal segment, or longer, extending to last segment, leaving only a part of the pygofers and ovipositor exposed. Abdomen long and tapering, ending in a long ovipositor. Male, vertex shorter, elytra long, equalling the tip of the pygofers.

Color: Female, pale yellow, with carina on vertex darker, the dark stripe sometimes extending on to the middle of the pronotum and the scutellum. Lateral portions of vertex and pronotum often mottled with brown. Visible abdominal segments with a pair of usually basal brown spots dorsally. Males darker, grayish-brown, vertex and pronotum mottled with brown in addition to the median dark line.

External genitalia: Female, last ventral segment longer than preceding, posterior margin truncate, somewhat sinuate, with a small, but distinct, rounded median tooth; pygofers very long, tapering from broad base to acute apex, much exceeded by the very long and stout ovipositor. Male, valve small, just visible from under the large last ventral segment; plates at base about half the width of the last ventral segment, tapering rapidly to the long and slender apices; pygofers broad at base but tapering regularly to acute apex, the two together forming a triangle about twice as long as the plates, bearing a scant covering of short hairs.

Distribution: Taken only in Gove and Sumner counties but should occur throughout the state.

Hosts: Osborn and Ball give *Elymus canadensis* and *virginicus* as the chief grass hosts. It also occurs on *Aristida.*

Dorycephalus vanduzei O. & B.

Dorycephalus vanduzei O. & B., Proc. Dav. Acad. Sci., vii, p. 74, pl. 6, fig. 2, 1898.
Dorycephalus vanduzei Ball, Rept. Ia. Acad. Sci. for 1899, p. 68, 1900.
Dorycephalus vanduzei Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 216, 1909.
Dorycephalus vanduzei Van D., Cat. Hemip. N. A., p. 623, 1917.

Form: More slender than the preceding species, being about ten times as long as wide. Length, female, 13 to 14 mm.; male, 8.5 to 12 mm. Female, vertex about two and a half times as long as width across eyes, with three longitudinal carinæ. Pronotum nearly three-fourths as long as wide, with three longitudinal carinæ, and posterior margin not quite concave in front of scutellum. Elytra strongly veined, very short, reaching only to third abdominal segment. Abdomen very long and acutely tapering posteriorly. Male, smaller and narrower than the female, elytra very short, abdomen long and slender, terminated by the very long pygofers.

Color: Female, straw yellow, frequently unmarked, often with black median spots on anterior and posterior margins of pronotum and apex of scutellum and four on each abdominal segment, arranged in two dorsal and two more lateral rows. Male, darker than the female, vertex tipped with black and with basal black spot as well as with the spots on pronotum and scutellum, as in the female.

External genitalia: Female, last ventral segment about as long as the preceding, posterior margin slightly produced medially; pygofers remarkably long, their tips divergent below, and fringed with fine hairs. Male, last ventral segment short, about two-thirds as long as preceding, valve very small, triangular, plates nearly as broad at base as last ventral segment, very long and slender apically; pygofers very long and slender, over four times as long as the plates, divergent below for the greater part of their length, and covered with fine hairs.

Distribution: Reported from Pottawatomie and Hamilton counties.

Hosts: *Aristida purpurea* is given as the host plant by Osborn and Ball.

Genus HECALUS Stal.

In this genus the females have broad, rather parallel-margined heads which are quite foliaceous but not to the extent seen in the two members of *Dorycephalus*. The males have a much shorter and pointed head, not at all or much less foliaceous than in the females.

One member of this genus has been taken in the state, but two should occur.

KEY TO SPECIES.

A. Straw colored forms, rarely striped. *bracteatus.*
AA. Greenish forms, with longitudinal, yellowish or reddish stripes. *lineatus.*

Hecalus bracteatus Ball.

Hecalus bracteatus Ball, Can. Ent., xxxiii, p. 4, 1901.
Hecalus bracteatus Van D., Cat. Hemip. N. A., p. 624, 1917.

Form: Females long and oval, males smaller, resembling a long-headed *Deltocephalus*. Length, females, 7 mm.; males, 5 mm. Female, head not quite as long as width across the eyes, margin foliaceous. Pronotum over twice as broad as long, lateral margins long, posterior angles slightly produced, posterior margin slightly emarginate medially. Elytra short, covering first abdominal segment. Male, vertex roundingly triangular, one-third broader than long, margin not at all foliaceous. Elytra narrow and long, much exceeding abdomen.

Color: Females, straw colored, abdomen with narrow median fuscous line and four, broader, lateral lines which are bordered with fuscous lines. Male, milky white, often with five fuscous stripes on vertex and pronotum. Broad, whitish nervures of elytra thickly margined with fuscous dots.

External genitalia: Female, last ventral segment slightly longer than preceding, posterior segment broadly emarginate, with very small median lobe; pygofers widest at about one-third the distance from their base, then tapering to acute apex which equals the ovipositor. Male, valve large, triangular; plates broad at base; together forming a triangle about as long as broad, margins straight, armed with a row of stout spines; pygofers small, much exceeded by the plates.

Distribution: Should occur in western Kansas.

Hosts: A grass feeder, but definite host unknown.

Hecalus lineatus (Uhl.).

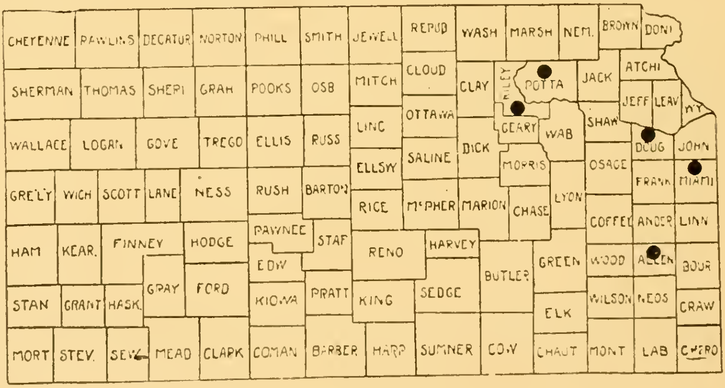
Glossocratus lineatus Uhl., Bul. U. S. Geol. Geog. Surv., iii, p. 463, 1877.
Glossocratus fenstratus Uhl., Bul. U. S. Geol. Geog. Surv., iii, p. 464, 1877.
Glossocratus fenstratus Sign., Ann. Soc. Ent. Fr., ser. 5, ix, p. 268, 1879; x, p. 42, pl. 1, fig. 37, 1880.
Hecalus lineatus Sign., Ann. Soc. Ent. Fr., ser. 5, ix, p. 267, pl. 7, fig. 25, 1879.
Hecalus lineatus O. & B., Proc. Ia. Acad. Sci., iv, p. 188, pl. 20, fig. 2, 1897.
Hecalus lineatus Ball, Rept. Ia. Acad. Sci., for 1899, p. 68, 1900.
Hecalus lineatus Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 64, fig. 6, 1912.
Hecalus lineatus Van D., Cat. Hemip. N. A., p. 624, 1917.

Form: Intermediate between *Dorycephalus* and *Spangbergiella*. Rather large, flat forms, with smaller males. Length, female, 10.5 to 13 mm.; male, 7 to 8 mm. Female, vertex about as long as width across eyes, slightly narrowed in front of eyes, then widening to spoon-shaped tip which is quite foliaceous and slightly reflexed. Pronotum over twice as broad as long, lateral margins long and parallel, posterior margin concave in front of scutellum. Scutellum broad and short. The elytra may be short, leaving last three segments of abdomen exposed, or long, exposing only the pygofers. In the smaller long-winged forms, the vertex does not widen in front of the eyes and is shorter. Ovipositor is long and exserted. Male, vertex not as long as width across eyes, more acute anteriorly and not as foliaceous as in the females.

Color: Bright green with four parallel orange-red lines on head, pronotum and scutellum. Nervures of elytra also orange-red and abdomen also striped. In the long-winged males there is a black band across the wings about medially and a larger apical one, between which is a white or hyaline area; the pygofers are black. In the short-winged males there is just a suggestion of a black band across the tips of the wings and the pygofers are often merely tipped with black.

External genitalia: Female, last ventral segment half longer than preceding segment, posterior margin sinuate on either side of a short, rounding, median lobe; pygofers broad at base, acute apically, greatly exceeded by the very long, apically haired ovipositor. Male, valve very small, triangular; plates wide at base, tapering regularly to long, acute, upturned and frequently overlapping tips; pygofers very characteristic of the species, being very long and style-like, ending in two widely separated and acute apices, finely serrate along inner margin and bearing, laterally, a brush of long spines in front of the middle, with a few along apical portion of dorsal margin and a brush at the apex.

Distribution: Occurs in the eastern portion of the state, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
SALINE
DICK
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
MORRIS
CHASE
LYON
OSAGE
FRANK
MIAMI
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
EDW
RENO
HARVEY
BUTLER
GREEN
WOOD
ALLEN
BOUR
STAN
GRANT
HASK.
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
ELK
WILSON
NEOS
CRAW
MORT
STEV.
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Genus SPANGBERGIELLA Sign.

This genus stands between *Hecalus* and *Parabolocratus*, the head not being as foliaceous as in the former genus, and thinner than in the latter. The head of the female is much produced and foliaceous, but in the male the head is shorter and thicker. Very characteristic of the genus are the bright red converging lines on the vertex and pronotum. The elytra are always long.

KEY TO SPECIES.

A. Head broadly rounded anteriorly, foliaceous in female, oblique stripes of pronotum not in line with those of vertex. *vulnerata.*

AA. Head distinctly acute, not foliaceous in female, oblique stripes of pronotum nearly in line with those of vertex. *mexicana.*

Spangbergiella vulnerata (Uhl.).

Glossocratus vulnerata Uhl., Bul. U. S. Geol. Geog. Surv., iii, p. 464, 1877.
Glossocratus laecertæ Sign., Ann. Soc. Ent. Soc. Fr., ser. 5, ix, pl. 8, fig. 29, 1879.
Spangbergiella vulnerata Sign., Ann. Ent. Soc. Fr., ser. 5, ix, p. 274, 1879.
Spangbergiella vulnerata Uhl., Stand. Nat. Hist., ii, p. 247, 1884.
Spangbergiella vulnerata Ball, Rept. Ia. Acad. Sci. for 1899, p. 68, 1900.
Spangbergiella vulnerata Osb., 20th Rept. N. Y. St. Ent., p. 516, 1905.
Spangbergiella vulnerata Van D., Cat. Hemip. N. A., p. 624, 1917.
Spangbergiella vulnerata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 50, 1919.

Form: Larger than following species, broad. Length, female, 7.25 to 8 mm.; male, 5.5 mm. Vertex of female about as long as width across the eyes, broadly rounded apically and foliaceous. Vertex of male about two-thirds as long as basal width between eyes, rounded apically, not at all foliaceous. Pronotum twice as wide as long, posterior margin emarginate in front of scutellum, with distinct humeral margins. Elytra long, leaving only tip of ovipositor exposed and exceeding the abdomen in the male.

Color: Greenish or yellowish-green. Vertex with two converging red lines which start from near the eyes. Pronotum with median red line on posterior half and a pair of converging lines which start from the inner angle of the humeral margin and extend across to the anterior margin to points that divide the distance between the bases of the lines on the vertex into equal thirds. Scutellum either unicolorous or with three faint yellow stripes. Elytra either unicolorous or with nervures slightly orange-yellow.

External genitalia: Female, last ventral segment longer than preceding, truncate posteriorly; pygofers acutely tapering posteriorly, exceeded by ovipositor. Male, valve small, rounded, plates broad at base, tapering to long acute tips, margins with few spines near the base; pygofers acute apically, slightly longer than plates, covered with coarse spines.

Distribution: Collected in Labette county.

Hosts: Probably a grass feeder.

Spangbergiella mexicana Bak.

Spangbergiella mexicana Bak., Can. Ent., xxix, p. 157, 1897.
Spangbergiella mexicana Barb., Bul. Am. Mus. Nat. Hist., xxxiii, p. 533, 1914.
Spangbergiella vulnerata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 36, 1916.
Spangbergiella mexicana Van D., Cat. Hemip. N. A., p. 625, 1917.
Spangbergiella mexicana DeL., Ohio Jl. Sci., xviii, p. 233, 1918.
Spangbergiella mexicana Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 50, 1919.

Form: Smaller than *vulnerata*. Length, 5 to 6.5 mm. Vertex about as long as basal width, shorter in the male, acutely pointed, not at all foliaceous. Pronotum about twice as broad as long, narrowed anteriorly, humeral margins distinct, posterior margin slightly concave. Elytra long, reaching ovipositor in female, exceeding abdomen in male.

Color: Pale or yellowish-green. Vertex with two oblique red lines, nearly in line with a pair on pronotum which also bears a median basal red line. Elytra with veins, except apical ones, yellow or red, with black dots at end of claval suture, a pair near inner and outer margins apically and sometimes one almost two-thirds back on costal margin.

External genitalia: Female, last ventral segment twice as long as preceding, posterior margin slightly rounding; acutely tapering pygofers much exceeded by ovipositor, both pygofers and ovipositor with a few stout spines. Male, last ventral segment broader and longer than preceding, widest posteriorly and with posterior margin broadly concave; valve small and triangular; plates about half as wide basally as last ventral segment, sinuately tapering to acute upturned apices, margined with stout spines; pygofers broad, much exceeding plates, separated ventrally at apex and covered with stout spines.

Distribution: Seemingly more abundant than preceding species. Specimens have been taken in Cherokee, Douglas, McPherson and Pottawatomie counties.

Hosts: Taken on grasses in rather open woods.

Genus PARABOLOCRATUS Fieb.

The members of this genus differ from the preceding genera of the *Dorydiaria* in not having foliaceous heads, which instead are parabolic in outline in the female, produced angularly, and in the male, wider than long. They are uniformly greenish or yellowish-green species, with both brachypterous and macropterous females and macropterous males.

Three of the North American species should occur in the state, two of which have been collected here.

KEY TO SPECIES.

A. Female vertex broadly rounded; male vertex with thin margins often lined with black beneath. *viridis.*

AA. Female vertex more or less angulate; male vertex with thicker margins and never lined with black beneath.

  B. Female vertex thin-margined; males yellowish-green, over 5 mm. in length. *flavidus.*

  BB. Female vertex thick margined; male brownish-green, less than 4 mm. in length. *brunneus.*

Parabolocratus viridis (Uhl.).

Glossocratus viridis Uhl., Bul. U. S. Geol. Geog. Surv., iii, p. 462, 1877.

Gypona reverta (Uhler MS.), Hayden's Surv. Tenn., Rept. for 1870, p. 472, 1872.

Parabolocratus viridis Sign., Ann. Soc. Ent. Fr., ser. 5, ix, p. 275, pl. 8, fig. 30, 1879.

Selenocephalus cyperaceæ (Fitch MS.) Sign., Ann. Soc. Ent. Fr., ser. 5, ix, pp. 88, 275, 1879.

Parabolocratus viridis Osb., Proc. Ia. Acad. Sci., i, pl. 2, p. 175, 1892.

Parabolocratus viridis G. & B., Hemip. Colo., p. 84, 1895.

Parabolocratus viridis O. & B., Proc. Ia. Acad. Sci., iv, p. 189, pl. 21, fig. 1, 1897.

Parabolocratus viridis Ball, Rept. Ia. Acad. Sci. for 1899, p. 71, 1900.

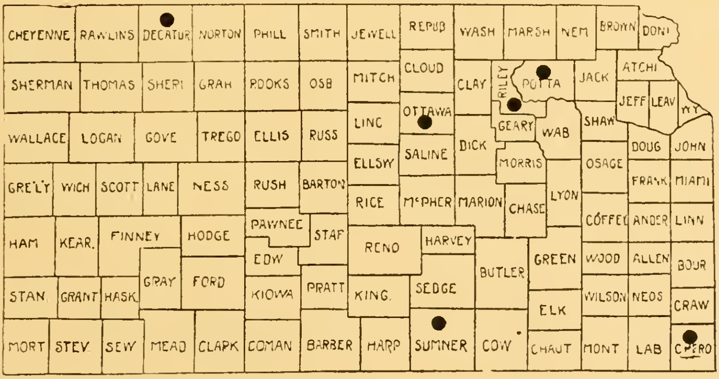
Parabolocratus viridis Osb., 20th Rept. N. Y. St. Ent., p. 515, 1905.
Parabolocratus viridis Gibs., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 68, fig. 8, 1912.
Parabolocratus viridis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 37. 1916.
Parabolocratus viridis Van D., Cat. Hemip. N. A., p. 625, 1917.

Form: The largest of the members of this genus. Length, females, 6 to 8.25 mm.; males, 5 to 6 mm. Vertex of female broadly rounding, thin-margined, two-thirds as long as width between eyes. Vertex of male distinctly angular, thin-margined, about two-thirds as wide as long. Pronotum over twice as broad as long, lateral margins long and parallel, humeral margins distinct, posterior margin emarginate. Scutellum large and broad. Elytra of female either short and broad, exposing last two segments of abdomen, or long and narrower, just showing ovipositor, apically broadly rounded. Elytra of male long and narrow, exceeding abdomen.

Color: Yellowish-green, with nervures of elytra a bright green. Vertex of male often with black line under margin.

External genitalia: Female, last ventral segment longer than preceding, lateral margins parallel, posterior margin rounded, with sometimes a wide but very short lobe on median third; pygofers tapering acutely, exceeded by ovipositor. Male, last ventral segment longer than preceding, widest posteriorly; valve small and triangular; plates wide basally, tapering suddenly at basal third and then evenly to long acute tips, median half of lateral margins with coarse spines; pygofers broad, separated ventrally at the apices, exceeding the plates and covered with spines.

Distribution: Found throughout the northern and eastern portions of the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GREELY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
COFFEE
ANDER
LINN
EDW
BUTLER
GREEN
WOOD
ALLEN
BOUR
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS
CRAW
ELK
MORT
STEV
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: A grass feeder. Taken by the writer on coarse grasses on low land.

Parabolocratus flavidus Sign.

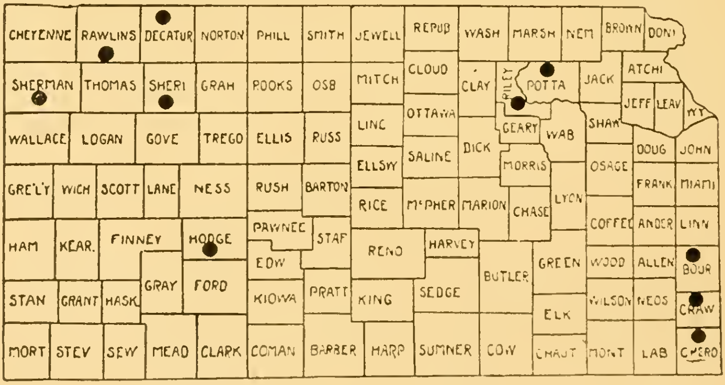
Parabolocratus flavidus Sign., Ann. Soc. Ent. Fr., ser. 5, ix, p. 276, pl. 8, fig. 31, 1879.
Parabolocratus flavidus Ball, Rept. Ia. Acad. Sci. for 1899, p. 71, 1900.
Parabolocratus flavidus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 37, 1916.
Parabolocratus flavidus Van D., Cat. Hemip. N. A., p. 625, 1919.
Parabolocratus flavidus Fent., Ohio Jl. Sci., xviii, No. 6, p. 183, 1918.
Parabolocratus flavidus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 48, 1919.

Form: Somewhat narrower than *viridis*. Length, 5 to 6.25 mm. Vertex in both sexes distinctly angularly produced, about three-fourths as long as wide, concave, margins rather sharp. Pronotum characteristic of the genus. Elytra long, exceeding the abdomen, frequently a black spot at tip of clavus and another at tip of inner apical cell.

Color: Yellowish-green. Elytra with greenish nervures and frequently with brownish apices. Tip of ovipositor reddish.

External genitalia: Female, last ventral segment very long, posterior margin roundingly produced; pygofers short, much exceeded by the spiny-tipped ovipositor. Male, valve very small, triangular; plates broad at base, spiny, lateral margins concavely tapering to long acute tips; pygofers much exceeding plates and thickly covered with long spines.

Distribution: Fairly common over the state, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
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RUSS
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OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
SALINE
DICK
MORRIS
OSAGE
ELLSW
GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
COFFEE
ANDER
LINN
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KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
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BUTLER
GREEN
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GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
WILSON
NEOS
CRAW
ELK
MORT
STEV
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Taken on coarse grasses on low land.

Parabolocratus brunneus Ball.

Parabolocratus brunneus Ball., Rept. Ia. Acad. Sci. for 1899, p. 71, 1900.
Parabolocratus brunneus Van D., Hemip. N. A., p. 626, 1917.

Form: Smaller than other members of the genus. Length, female, 6 mm.; male, 3.5 to 4 mm. Vertex relatively shorter than in preceding species, but in both sexes the margin is quite thick. The elytra may either reach the last ventral abdominal segment, or, in some females, cover about two-thirds of the abdomen, the nervures always distinct.

Color: Female, pale green, nervures of elytra greenish, ovipositor tipped with red. Male, pale green, most of pronotum and elytra brownish, nervures of elytra darker brown.

External genitalia: Female, last ventral segment twice as long as preceding, posterior margin truncate, with a very small median lobe; pygofers longer than in *flavidus* but much exceeded by the ovipositor. Male, valve very small, triangular; plates tapering suddenly near base and then extending into long and slender apical processes, margins bearing a few spines; pygofers long, bearing many long brown spines.

Distribution: This species has not yet been reported from Kansas but should be taken in the western part of the state.

Hosts: Doctor Ball described this species from specimens taken from *Distichlis maritima.*

Genus DICYPHONIA Ball.

In this genus the head is as long or slightly longer than the width between the eyes. The vertex is narrower than in *Parabolocratus*, the apex obtusely rounding in the female, rather acute in the male, the disc concave, and the margins sharp. The pronotum is about twice as wide as long, broadly rounding in front, emarginate posteriorly, and with long lateral margins. The elytra are short in the female, long in the male. The genus includes brownish forms, due to ramose pigmentation.

The single species belonging to this genus occurs in Kansas.

Dicyphonia ornata (Bak.).

Platymetopius ornatus Bak., Can. Ent., xxxii, p. 49, 1900.
Dicyphonia ramentosa Ball, Rept. Ia. Acad. Sci. for 1899, p. 69, pl. 5, figs. 1-5, 1900.
Dicyphonia ornata Van D., Cat. Hemip. N. A., p. 626, 1917.

Form: Females large and robust. Length, 6.25 to 7 mm. Males smaller, like *Platymetopius* in general appearance. Length, 4 mm. Female, vertex long and narrow, longer than wide, obtusely-rounding apically, anterior margin elevated, disc concave. Pronotum over twice as wide as long. Elytra either covering abdomen entirely or only half way. Male, vertex a little longer than wide, more pointed than in female, elytra always completely covering abdomen, strongly flaring apically.

Color: Female, creamy yellow, vertex with a broad, irregular brown band which extends on to the pronotum and scutellum. These also have brown markings laterally, and the elytra show ramose, brown markings. Exposed portion of abdomen striped with brown. Males either like female except for dark brown apices of elytra, or, more usually, with all the markings much darker and heavier, giving the insect a dark brown or black appearance with triangular light markings, most conspicuous of which are three large costal and several smaller hyaline spots on the apical half of the elytra.

External genitalia: Female, last ventral segment twice as long as the preceding, posterior margin truncate except for small median projection; pygofers short, bearing a very few spines, much exceeded by the very long ovipositor. Male, valve hidden by last ventral segment; plates together about half as wide as last ventral segment, sinuately narrowed laterally to long, acute apices; pygofers together forming a triangle a little wider than long, bearing a few long spines.

Distribution: Occurs in western Kansas. Specimens have been taken in Decatur and Greeley counties.

Hosts: Doctor Ball gives *Sporobolus cryptandrus* as the host.

Genus SCAPHOIDEUS Uhl.

Prof. Herbert Osborn states that the most important characters of this genus are "the deeply sinuate occiput, the long antennæ, the large loræ, approximate to margin of cheeks (except in *sanctus* group), the narrow vertex, the width and length of which are usually about equal, and the recurved nodal or costal veins. The clypeus is usually widened at tip, and for the more typical members of the genus the outer anteapical cell is narrowed behind, becoming pointed, and, in some species, stylate."

Of the nine species keyed below, six have been taken and the other three should occur in the state.

KEY TO SPECIES.*

A. Loræ remote from the margin of the cheeks; common elytral picture cruciate; claval vein straight, meeting suture at acute angle. *sanctus.*

AA. Loræ contiguous to or merging with border of cheeks; elytral picture not cruciate, outer claval vein curved or hooked at the distal end.

B. Postnodal cell scarcely widened distally.

C. Nodal vein arising from discal cell, transverse orange band on vertex and a black one just before. *auronitens.*

CC. Nodal vein arising from anteapical cell.

D. Vertex flat with transverse impressed line. *jucundus.*

DD. Vertex convex, without impressed line. *scalaris.*

BB. Postnodal cell much widened distally.

C. Outer claval not strongly hooked at distal end, cross nervure to claval suture indistinct or wanting.

D. Outer claval sinuate, approaching inner near its middle, marked with fuscous. *productus.*

DD. Outer claval nearly straight and parallel to inner, curved at tip. *intricatus.*

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* Adapted from key by Professor Osborn, Ohio Nat., xi, p. 250, 1910.

AA. Loræ contiguous—*concluded.*

CC. Outer claval strongly hooked at distal end, usually with distinct cross nervure from outer claval to claval suture.

D. No distinct cross veins between claval veins. *immistus.*

DD. A distinct cross vein between claval veins.

E. Outer claval approximating claval suture posteriorly, face black. *melanotus.*

EE. Outer claval remote from claval suture posteriorly, elytra entirely gray. *cinerosus.*

Scaphoideus sanctus (Say).

Jassus sanctus Say, Jl. Acad. Nat. Sci. Phila., vi, p. 307, 1831; Compl. Writ., ii, p. 383.
Scaphoideus picturatus Osb., Proc. Ia. Acad. Sci., v, p. 243, 1898.
Scaphoideus picturatus Osb., Jl. Cinc. Soc. Nat. Hist., xix, p. 193, 1900.
Scaphoideus sanctus Osb., Ohio Nat., xi, p. 251, 1910.
Scaphoideus sanctus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 55, 1916.
Scaphoideus sanctus Van D., Cat. Hemip. N. A., p. 629, 1917.

Form: Length, 4 to 5 mm. Vertex slightly shorter than width between the eyes, quite angulate. Pronotum about twice as wide as long, anterior margin convex, posterior margin truncate or slightly concave, lateral margins very short, humeral margins long. Elytra long, much exceeding the abdomen.

Color: Vertex whitish or yellowish with two small brown spots near apex, one back of each ocellus, and with a brown median line. Pronotum yellowish-brown except for white rectangular spot on disc, the posterior half darker. Scutellum yellow. Elytra white, with large brown cruciform mark on middle, the arms enclosing a white spot and extending to the costal margin; apical third irregularly marked with brown spots.

External genitalia: Female, last ventral segment twice as long as preceding, posterior margin with large, long, lateral lobes between which is a pair of shorter lobes separated by a median notch; pygofers long and narrow, widest at the middle, with spines on posterior two-thirds, slightly exceeded by ovipositor. Male, valve large, posterior margin roundingly produced; plates wide and long, exceeding pygofers, spined laterally and tapering to obtuse apices, each with a black disc basally; pygofers spiny and short.

Distribution: Not yet reported from the state, but should be taken in the eastern part.

Hosts: De Long reports taking specimens from wild rose.

Scaphoideus auronitens Prov.

Jassus areatus (Harris MS.) in Hitchcock, Geol. Mass., edn. 2, p. 580, 1835.
Scaphoideus auronitens Prov., Pet. Faune Ent. Can., iii, p. 277, 1889.
Scaphoideus auronitens Osb., Jl. Cinc. Soc. Nat. Hist., xix, p. 194, 1900.
Scaphoideus auronitens Osb., 20th Rept. N. Y. St. Ent., p. 524, 1905.
Scaphoideus auronitens Osb., Ohio Nat., xi, p. 254, 1910.
Scaphoideus auronitens Osb., Me. Agr. Exp. Sta., Bul. 238, p. 115, 1915.
Scaphoideus auronitens DeL., Tenn. St. Bd. Ent., Bul. 17, p. 56, 1916.
Scaphoideus auronitens Van D., Hemip. N. A., p. 630, 1917.
Scaphoideus auronitens Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 66, 1919.

Form: Length, 4.5 to 5.75 mm. Vertex wider than long, not as pointed apically as in *sanctus.* Pronotum about twice as wide as long, quite convex anteriorly, slightly concave posteriorly, lateral margins long, about the length of the humeral margins; elytra long, nodal vein arising from the discal cell, postnodal cell scarcely widened distally.

Color: Vertex yellowish-white with very characteristic broad orange band across middle in front of which is a short black band, and also a larger one parallel with the anterior margin. Pronotum with orange band on anterior margin and a fainter one on the posterior half, parallel to the posterior margin. Scutellum with the basal angles dull orange, the disc darkened medially. Elytra brownish, nervures darker, three spots on clavus along median suture, black.

External genitalia: Female, last ventral segment nearly four times as long as preceding one, cleft by broad excision, reaching nearly to the base, into two large rounding lateral lobes; the spiny pygofers are long and narrow, exceeded slightly by the ovipositor. Male, valve broad and short, truncate posteriorly, or with very small median tooth; plates large and broad, obtuse apically and with an impressed line parallel to the lateral margin which is covered with long silky hairs; long, membranous and hairy tail-like structures terminate the plates; spiny pygofers long and narrow, much exceeding plates.

Distribution: Taken in Douglas, Pottawatomie and Riley counties.

Hosts: Professor Osborn gives *Geranium Robertianum* as a host. De Long reports taking it on canebrake.

Scaphoideus jucundus Uhl.

Scaphoideus jucundus Uhl., Trans. Md. Acad. Sci., i, p. 34. 1889.
Scaphoideus jucundus Osb., Jl. Cinc. Soc. Nat. Hist., xix, p. 195, 1900.
Scaphoideus jucundus Osb., 20th Rept. N. Y. St. Ent., p. 524, 1905.
Scaphoideus jucundus Osb., Ohio Nat., xi, p. 254, 1910.
Scaphoideus jucundus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 114, 1915.
Scaphoideus jucundus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 56, 1916.
Scaphoideus jucundus Van D., Hemip. N. A., p. 630, 1917.
Scaphoideus jucundus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 68, 1919.

Form: Larger than preceding species. Length, 5 to 6 mm. Vertex wider than long, flat, with transverse impressed line, roundingly angled anteriorly. Pronotum twice as broad as long, lateral margins long, anteriorly convex, posteriorly slightly concave. Elytra long and somewhat flaring posteriorly, nodal vein arising from discal cell, postnodal cell scarcely widened posteriorly.

Color: Orange-yellow marked with white. Vertex with median line, six spots near anterior margin of pronotum, two spots on sides, apex and two lines on disc of scutellum and several spots on elytra, white.

External genitalia: Female, last ventral segment over twice as long as preceding one, posterior margin rounded and medially produced; pygofers long and narrow, slightly exceeded by ovipositor, spiny on posterior half. Male, valve triangular, narrow but long; plates long, somewhat fine haired, truncate tips bearing membranous tails which are much shorter than in *auronitens*, lateral margins spined; pygofers long and narrow, much exceeding plates, spiny on posterior half.

Distribution: This species though not yet taken in the state, should occur in the eastern portion.

Hosts: De Long reports it on oak.

Scaphoideus scalaris Van D.

Scaphoideus scalaris Van D., Ent. Am., vi, p. 51, 1890.
Scaphoideus scalaris Osb., Jl. Cinc. Soc. Nat. Hist., xix, p. 198, 1900.
Scaphoideus scalaris Osb., 20th Rept. N. Y. St. Ent., p. 523, 1905.
Scaphoideus scalaris Osb., Ohio Nat., ix, p. 464, 1909; xi, p. 255, 1910.
Scaphoideus scalaris Osb., Me. Agr. Exp. Sta., Bul. 238, p. 114, 1915.
Scaphoideus scalaris DeL., Tenn. St. Bd. Ent., Bul. 17. p. 56, 1916.
Scaphoideus scalaris Van D., Cat. Hemip. N. A., p. 631, 1917.
Scaphoideus scalaris Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 67, 1919.

Form: Length, 5 to 5.5 mm. Vertex as long as wide, quite angulate anteriorly. Pronotum with anterior margin very convex, posterior margin slightly concave. Elytra much exceeding abdomen, nodal vein rising from anteapical cell, postnodal cell scarcely widened distally.

Color: Grayish-brown. Vertex light, marked with brown lines, median spot near apex, preapical marginal lines and ocelli appearing white, as does the portion between the brown lines on the basal portion. Pronotum having mottled appearance. Scutellum frequently appearing to have six light spots. Elytra with three very characteristic light spots on claval suture, nervures dark.

External genitalia: Female, last ventral segment three times as long as preceding, lateral angles broadly rounding to nearly truncate, slightly excised posterior margin; pygofers long, widest near middle, spiny on distal half, slightly exceeded by ovipositor. Male, valve small, broadly triangular; plates wide and short, slightly haired marginally, about half as long as spiny pygofers and tipped with membranous tails reaching to tips of pygofers.

Distribution: Taken in Douglas and Pottawatomie counties.

Hosts: Osborn records a single specimen from Maine "on blueberry." It of course has some other host in Kansas.

Scaphoideus productus Osb.

Scaphoideus productus Osb., Jl. Cinc. Soc. Nat. Hist., xix, p. 200, 1900.
Scaphoideus productus Osb., Ohio Nat., xi, p. 258, 1910.
Scaphoideus productus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 115, 1915.
Scaphoideus productus Van D., Cat. Hemip. N. A., p. 632, 1917.
Scaphoideus productus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 68, 1919.

Form: Larger than preceding species. Length, 5.5 to 6 mm. Vertex nearly as long as wide, disc flat, apex acutely pointed. Pronotum more than twice as wide as long, anterior margin convex, posterior margin slightly concave, lateral margins slightly longer than humeral. Elytra with postnodal cell much widened distally, outer claval not strongly hooked at distal end and approaching inner claval near its middle.

Color: Vertex yellowish-white, with a broad brown band which is produced medially to meet a darker marginal band. Pronotum and scutellum whitish, irregularly marked with brown. Elytra whitish with fuscous patches and dark nervures, giving them a general brown appearance.

External genitalia: Female, last ventral segment over twice as long as preceding, lateral angles rounded, posterior margin produced medially and with a small median notch; pygofers long, slightly exceeded by ovipositor, bearing bunches of spines at middle and near apex. Male, valve short; plates broad and short, obliquely truncate, less than half the length of the long, somewhat spiny pygofers.

Distribution: Taken in Cherokee and Pottawatomie counties.

Hosts: Osborn reports sweeping specimens from blueberry in Maine. Kansas host unknown.

Scaphoideus intricatus Uhl.

Scaphoideus intricatus Uhl., Trans. Md. Acad. Sci., i, p. 34, 1889.
Scaphoideus intricatus Osb., Jl. Cinc. Soc. Nat. Hist., xix, p. 202, 1900.
Scaphoideus intricatus Osb., 20th Rept. N. Y. St. Ent., p. 525, 1905.
Scaphoideus intricatus Osb., Ohio Nat., xi, p. 258, 1910.
Scaphoideus intricatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 58, 1916.
Scaphoideus intricatus Van D., Cat. Hemip. N. A., p. 632, 1917.

Form: Length, 4.75 to 6 mm. Vertex slightly longer than wide, flat, acutely pointed. Pronotum short, humeral margins long. Elytra with postnodal cell widened distally, outer claval nearly straight and parallel to inner.

Color: Vertex, pronotum and scutellum yellowish-white. Vertex with brown marginal and an irregular transverse band. Pronotum with large median brown band on anterior margin and two large brown ones on posterior margin. Scutellum with three basal brown spots. Elytra whitish or hyaline with brown spots and dark brown nervures, with three white spots on clavus along suture.

External genitalia: Female, last ventral segment nearly twice as long as preceding, truncate posteriorly, very slightly produced medially; pygofers long and narrow, nearly equalling ovipositor, a patch of brown bristles near the apex and whitish scattered bristles near the middle. Male, valve broad and roundingly angulate posteriorly; plates broad and long, nearly equalling pygofers, margined with a few silky hairs; pygofers with tuft of black bristles near apex.

Distribution: Taken in Pottawatomie county only.

Hosts: De Long has swept specimens from weeds. Professor Osborn mentions clover, *Cornus,* grape and *Cratægus* as host plants.

Scaphoideus immistus (Say).

(Pl. 11, figs. 1-2.)

Jassus immistus Say, Jl. Acad. Nat. Sci. Phila., vi, p. 306, 1831; Compl. Writ., ii, p. 382.

Scaphoideus immistus Uhl., Trans. Md. Acad. Sci., i, p. 33, 1889.

Scaphoideus immistus G. & B., Hemip. Colo., p. 94, 1895.

Scaphoideus immistus Osb., Jl. Cinc. Soc. Nat. Hist., xix, p. 204, 1900.

Scaphoideus immistus Osb. 20th Rept. N. Y. St. Ent., p. 525, 1905.

Scaphoideus immistus Osb., Ohio Nat., xi, p. 259, 1910.

Scaphoideus immistus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 116, 1915.

Scaphoideus immistus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 58, 1916.

Scaphoideus immistus Van D., Cat. Hemip. N. A., p. 632, 1917.

Scaphoideus immistus Fent., Ohio Jl. Sci., xviii, No. 6, p. 183, 1918.

Scaphoideus immistus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 69, 1919.

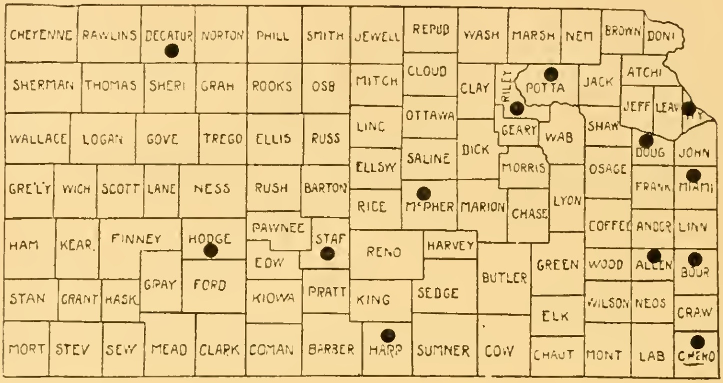
Form: Length, 4.75 to 6 mm. Vertex about as long as broad, flat, somewhat obtusely angled. Pronotum with anterior margin produced medially, twice as wide as long. Elytra with postnodal cell widened distally, with two to four oblique reflexed veins from outer anteapical cell to costal margin and with no distinct cross veins between claval veins.

Color: Vertex white with narrow black or brown marginal line and a broad, transverse, brown band with a median tooth. Face white, two black lines on upper part. Pronotum brown with faint whitish transverse band in front of middle. Scutellum white, with three fuscous bands. the apical half usually light. Elytra brown with darker nervures and scattered white spots, of which usually two are on the clavus along suture.

External genitalia: Female, last ventral segment twice as long as preceding, posterior margin somewhat produced, black, and often slightly notched medially; pygofers long and narrow, bearing a few scattered bristles till near the apex, where each bears two tufts of long black bristles; ovipositor exceeding the pygofers. Male, valve short, plates broad but short, obtusely pointed, spiny margined, much exceeded by the long pygofers, each of which bears two bunches of long, black bristles preapically.

Internal male genitalia: Styles short, with long process for attachment to connective equalling anterior end, a rounding lobe laterally past middle, terminating in an acute, outwardly curved apex; connective Y-shaped, the arms very short and curved, the stem long and thickened basally; œdagus with a short, thick, knobbed process for attachment to anal tube and two long obtusely pointed caudal processes.

Distribution: Our commonest member of the genus, well distributed over the state as shown by the following map:


CHEYENNE
RAWLINS
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LEAV
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WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
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BARTON
RICE
McPHER
MARION
CHASE
LYON
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MIAMI
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STAF
RENO
HARVEY
COFFEE
ANDER
LINN
EDW
GRAY
FORD
BUTLER
GREEN
WOOD
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KIOWA
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KING
SEDGE
WILSON
NEOS
ELK
CRAW
MORT
STEV
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Van Duzee reports it on witch hazel. Professor Osborn gives willow as a host. This is its food in Kansas. It is frequently taken at lights.

Scaphoideus melanotus Osb.

Scaphoideus melanotus Osb., Jl. Cinc. Soc. Nat. Hist., xix, p. 206, 1900.
Scaphoideus melanotus Wirtn., Ann. Carn. Mus., iii, p. 224, 1904.
Scaphoideus melanotus Osb., Ohio Nat., xi, p. 259, 1910.
Scaphoideus melanotus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 59, 1916.
Scaphoideus melanotus Van D., Cat. Hemip. N. A., p. 633, 1917.

Form: Length, 5 to 5.25 mm. Vertex about as long as basal width, flat or slightly concave, apex obtuse. Pronotum over twice as broad as long, anterior margin strongly convex, posterior slightly concave, lateral margins short. Elytra with postnodal cell much widened distally, a distinct cross vein between clavals and the outer claval approximating claval suture posteriorly.

Color: Vertex white, with narrow brown marginal band, heavier brown transverse band which is produced medially, and a black border on posterior margin medially. Face black. Pronotum white with light brown anterior band and broken posterior band, with large dark brown spots laterally. Scutellum white with three large light brown basal spots and two small black preapical ones. Elytra brown with three large white spots along suture and others irregularly placed.

External genitalia: Female, last ventral segment over twice as long as preceding, posterior portion black, posterior margin produced, with narrow but distinct median notch; pygofers widest at the middle, much exceeded by ovipositor, sparsely bristled except for two preapical tufts. Male, valve barely visible from under broad and long last ventral segment; plates a little over half as long as pygofers, scarcely tapering to obtuse, separated apices, with few marginal bristles; pygofers long and slender, sparsely bristled.

Distribution: Taken in Douglas, Cherokee and Pottawatomie counties.

Hosts: Unknown.

Scaphoideus cinerosus Osb.

Scaphoideus cinerosus Osb., Jl. Cinc. Soc. Nat. Hist., xix, p. 525, 1905.
Scaphoideus cinerosus Osb., Ohio Nat., xi, p. 259, 1910.
Scaphoideus cinerosus Van D., Cat. Hemip. N. A., p. 633, 1917.

Form: Length, 4 to 4.5 mm. Vertex nearly as long as basal width, disc flat, apex rather acute. Pronotum about twice as wide as long. Anterior margin quite convex, posterior margin slightly concave, lateral margins rather short, humeral margins longer. Elytra with outer claval strongly hooked at distal end, and with cross veins to inner claval and claval suture, and not approximating claval suture posteriorly.

Color: Light ashy-gray. Vertex white with narrow black marginal line and a brown transverse line between the anterior margin of the eyes. Pronotum light gray, marked with brown on anterior margin and several brown spots along posterior margin. Scutellum white, with three broad brown stripes and two black spots on each lateral margin. Elytra whitish with dark brown nervures and several cells spotted or irrorate with the same color.

External genitalia: Female, last ventral segment over twice as long as preceding, posterior margin black medially, roundingly and medially produced and with a small median notch; pygofers long and narrow, exceeded by ovipositor, with scattered bristles and two tufts on each side near the apex.

Distribution: Taken in Pottawatomie county only.

Hosts: Unknown.

Genus PLATYMETOPIUS Burm.

This genus is characterized by its long pointed vertex, narrow front, and characteristic venation. The elytra have three anteapical and five apical cells, two cross veins between the first and second sectors, and eight to ten oblique veins in the costal cell. They are also marked with fine brown pigment lines, and the cells, especially the anteapical and apical, may contain oval white spots.

Only five species of this genus have been taken in Kansas.

KEY TO SPECIES.*

A. Vertex flat, not channeled toward its apex, anterior margin rounding to the front; elytra without white areolar spots. *dorsalis.*

AA. Vertex more or less channeled toward the apex, anterior edge thin, acute or subacute.

- B. Face pale or yellow, usually infuscated at base and sides.
  - C. Markings of vertex in the form of lineations, usually a pale median line and a faint, slightly divergent one either side.
    - D. Face distinctly infuscated at sides; elytral markings distinct; length, 5 mm. *acutus.*
    - DD. Face obscurely infuscated at sides; elytral markings indistinct; length, 4 mm. or less. *cinereus.*
  - CC. Markings of vertex in form of a broken transverse vitta, median line short and apical. *frontalis.*
- BB. Face entirely brown or fuscous. *scriptus.*

Platymetopius dorsalis Ball.

Platymetopius frontalis var. dorsalis Ball, Ent. News, xx, p. 164, 1909.
Platymetopius dorsalis Van D., Ann. Ent. Soc. Am., iii, p. 224, 1910.
Platymetopius dorsalis Van D., Cat. Hemip. N. A., p. 637, 1917.

Form: Length, 4 mm. Vertex three-fourths as wide as long, flat, not channeled toward the apex, margins rounding. Pronotum nearly three times as wide as long, anterior margin convex, posterior margin slightly concave, lateral margins short, humeral margins long. Elytra broad and exceeding the abdomen.

Color: Yellow and fulvous; vertex creamy yellow, pronotum bright brown or fulvous with sides yellow, scutellum yellow, elytra bright fulvous with distal half of clavus and apices lighter. Face and below pale yellow.

External genitalia: Female, last ventral segment long, posterior margin roundingly and medially produced; sparsely spined pygofers are long and narrow, slightly exceeded by the ovipositor.

Distribution: The only specimens of this species taken are the type specimens from Pottawatomie county.

Platymetopius acutus (Say.).

(Pl. II, figs. 5-7.)

Jassus acutus Say, Jl. Acad. Nat. Sci., Phila., vi, p. 306, 1831; Compl. Writ., ii, p. 382.
Platymetopius acutus Uhl., Bul. U. S. Geol. Surv., iii, p. 473, 1877.
Platymetopius acutus Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Platymetopius acutus G. & B., Hemip. Colo., p. 84, 1895.
Platymetopius acutus O. & B., Proc. Ia. Acad. Sci., iv, p. 192, 1897.
Platymetopius acutus Van D., Ann. Ent. Soc. Am., iii, p. 219, 1910.

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* Adapted from key by Van Duzee, Ann. Ent. Soc. Am., iii, p. 216, 1910.

Platymetopius acutus Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 69, fig. 9, 1912.
Platymetopius acutus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 111, 1915.
Platymetopius acutus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 39, 1916.
Platymetopius acutus Van D., Cat. Hemip. N. A., p. 635, 1917.
Platymetopius acutus Fent., Ohio Jl. Sci., xviii, No. 6, p. 183, 1918.
Platymetopius acutus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 53, 1919.

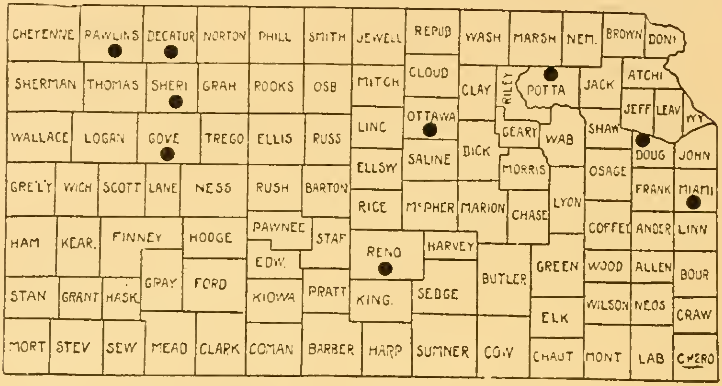
Form: Length, 4.5 to 5 mm. Vertex of male distinctly longer than width between the eyes, in female almost half longer than basal width. Pronotum twice as broad as long, anterior margin quite convex, posterior margin slightly concave, humeral margins longer than lateral margins. Elytra wide, exceeding abdomen.

Color: Vertex yellowish, irrorate with brown, an indistinct line near each eye, a pair on the disc, one on apical third, and four spots on posterior margin, whitish or yellowish. Pronotum brown, with five white longitudinal stripes. Scutellum brown, with two whitish longitudinal stripes. Elytra light brown with dark ramose lines and spots and distinct round or oval milky white spots. Face yellow, infuscated on base of front and outer portions of cheeks, former with broad, white, angular line which continues behind the eyes. Beneath black, marked with whitish.

External genitalia: Female, last ventral segment long, sinuate, narrowed posteriorly, lateral and posterior margins forming regular curve; pygofers long and narrow, scarcely exceeding ovipositor, sparsely bristled. Male, last ventral segment very short; valve very large, nearly as long as wide, broadly and obtusely angled posteriorly; plates long, nearly equalling sparsely bristled pygofers, widening after leaving base, then tapering regularly to subacute apices, lateral margins spiny.

Internal male genitalia: Styles broad basally, with large process for attachment to connective, terminating in a finger-like inner process about half the width of the middle portion; connective very characteristic of the genus, consisting of a broad, short-armed U-shaped piece from which there extend out, separated by a small process, two long styles which each curve entirely around the œdagus and extend far beyond it, ending in a somewhat flattened and then acutely pointed apex; œdagus viewed from the side is V-shaped, with two processes directed caudad for attachment to base of anal tube, the œdagus proper being a gently curving, obtusely pointed organ with its surface roughened or serrated, directed dorso-caudad.

Distribution: Occurs throughout the state, though more abundant in northern part as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
SALINE
DICK
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
MORRIS
OSAGE
GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
COFFEE
ANDER
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GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
BUTLER
WILSON
NEOS
CRAW
ELK
MORT
STEV
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Taken usually on grasses on which it seems to be a general feeder.

Platymetopius cinereus O. & B.

(Pl. II, figs. 3-4.)

Platymetopius cinereus O. & B., Proc. Ia. Acad. Sci., iv, p. 193, pl. 26, fig. 1, 1897.
Platymetopius cinereus Van D., Ann. Ent. Soc. Am., iii, p. 223, 1910.
Platymetopius cinereus Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 72, 1912.
Platymetopius cinereus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 39, 1916.
Platymetopius cinereus Van D., Cat. Hemip. N. A., p. 637, 1917.
Platymetopius cinereus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 56, 1919.

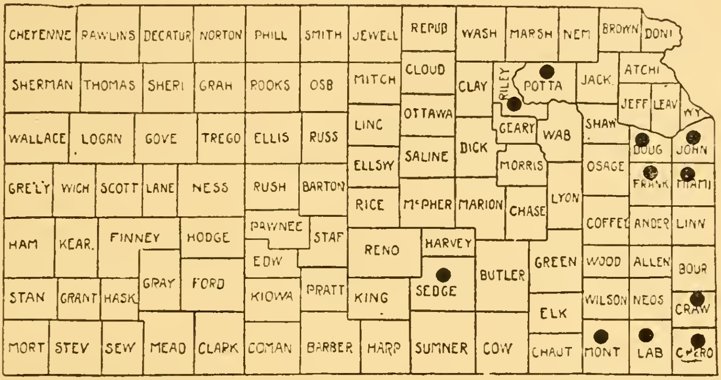
Form: Smallest member of genus in Kansas. Length, 3.5 to 4 mm. Vertex of female three-fifths as wide as long, in male nearly as wide as long. Pronotum characteristic of the genus, lateral margins short. Scutellum large. Elytra long and broad.

Color: Cinereous; vertex yellowish, irrorate with brown, with light lines on disc and median line on apical third. Pronotum of same color with five faint longitudinal lines. Scutellum yellowish, with basal and apical angles darker. Elytra light or hyaline with brown irrorations and with whitish hyaline spots, costal and apical veins black, especially in the male.

External genitalia: Female, last ventral segment long, narrowed posteriorly, posterior margin medially produced and with a slight median notch; pygofers long, widest at the middle, slightly exceeded by ovipositor. Male, posterior margin of last ventral segment obtusely and angularly incised; valve large, obtusely rounded at apex, over half the length of the spiny-margined and obtusely pointed plates; pygofers spiny, acute at apex, slightly exceeding plates.

Internal male genitalia: Styles much as in *acutus*, but differing in small details, especially the relatively longer terminal finger and the angle it makes with the rest of the style; connective in the shape of a flat "W" with all the bends rounded, distinctly flatter and smaller than in *acutus*, and with two long curling processes, flattened for a much longer distance than in *acutus* and ending in a sharp point; œdagus, viewed laterally, U-shaped with anterior arm straight and posterior curved, former extending beyond curve of U to form a short stem.

Distribution: Common in the eastern portion of the state as shown by the following map:


CHEYENNE
RAWLINS
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NORTON
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SMITH
JEWELL
REPUB
WASH
MARSH
NEM
BROWN
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SHERMAN
THOMAS
SHERI
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ROOKS
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MITCH
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POTTA
JACK
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
FRANK
MIAMI
GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
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KIOWA
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SEDGE
BUTLER
WILSON
NEOS
CRAW
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MORT
STEV
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MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Osborn and Ball give *Bouteloua* as the probable host. De Long reports it on "various grasses."

Platymetopius frontalis Van D.

(Pl. II, figs. 8-9.)

Platymetopius frontalis Van D., Can. Ent., xxii, p. 112, 1890.
Platymetopius frontalis Van D., Bul. Buf. Soc. Nat. Sci., v, p. 198, 1894.
Platymetopius frontalis O. & B., Proc. Ia. Acad. Sci., iv, p. 193, 1897.
Platymetopius frontalis Osb., 20th Rept. N. Y. St. Ent., p. 517, 1905.
Platymetopius frontalis Van D., Ann. Ent. Soc. Am., iii, p. 225, 1910.
Platymetopius frontalis Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 71, fig. 10, 1912.
Platymetopius frontalis Osb., Me. Agr. Exp. Sta., Bul. 238, p. 113, 1915.
Platymetopius frontalis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 40, 1916.
Platymetopius frontalis Van D., Cat. Hemip. N. A., p. 637, 1917.
Platymetopius frontalis Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 57, 1919.

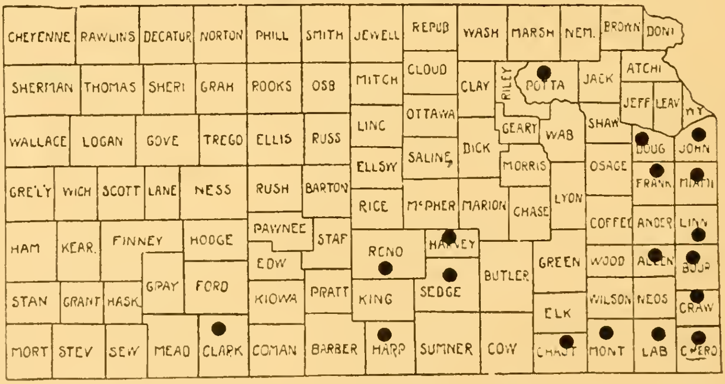
Form: Short and stout. Length, 3.5 to 4 mm. Vertex about one-fourth longer than wide in the male, slightly longer in the female, rather obtusely pointed and with a longitudinal depression. Pronotum obscurely and transversely wrinkled, short, over twice as broad as long.

Color: Dark brown or black; vertex with white apical line, transverse vitta of similar lines in front of the eyes and four basal white spots. Face yellow, infuscated at sides and base, angled line indistinct. Pronotum dark brown, showing five faint longitudinal lines. Scutellum with two faint longitudinal lines and apex white. Elytra with distinct milky white spots, costal area whitish with heavy black veins.

External genitalia: Female, last ventral segment broad, slightly keeled, posterior margin rounding and with a slight median notch; sparsely spined pygofers broad and slightly exceeded by the ovipositor. Male, last ventral segment distinctly and roundingly emarginate; valve large, slightly wider than long, rounded posteriorly; plates, spiny-margined, broad at base, subacute apically, about as long medially as the valve, somewhat exceeded by the spiny pygofers.

Internal male genitalia: Styles larger than in preceding species, broad at base, then of nearly uniform diameter to terminal finger-like process which is relatively long and slender; connective in the form of an arc with a slight median swelling on the inside and two small processes on the convex surface, between which arise two very long, slender and curving processes, which in the specimen dissected did not encircle the œdagus as in the two preceding species; œdagus much as in *einereus*, but apically broadened rather than tapering and with distinct apical teeth dorsally.

Distribution: Our most abundant member of this genus, though seemingly largely confined to the eastern portion of the state, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
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CLOUD
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RILEY
POTTA
JACK
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
DICK
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
MORRIS
OSAGE
FRANK
MIAMI
GREELY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
GREEN
WOOD
ALLEN
BOUR
EDW
BUTLER
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
WILSON
NEOS
CRAW
ELK
MORT
STEV
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Taken commonly on grasses and weeds.

Platymetopius scriptus Ball.

Platymetopius scriptus Ball, Ent. News, xx, p. 165, 1909.
Platymetopius scriptus Van D., Ann. Ent. Soc. Am., iii, p. 228, 1910.
Platymetopius scriptus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 42, 1916.
Platymetopius scriptus Van D., Cat. Hemip. N. A., p. 638, 1917.

Form: Much like *frontalis.* Length, 3.5 to 4 mm. Vertex slightly longer than basal width, disc slightly convex but with distinct median longitudinal depression. Pronotum over twice as wide as long, anterior margin quite convex, posterior slightly concave, humeral margins nearly twice the length of the lateral. Elytra broad and rather short.

Color: About like *frontalis* except for the dark face. Vertex with three apical white lines and two faint basal and median ones, the latter between a pair of white spots near the apex, and another pair near their base. Face irrorate with brown, with short, light, oblique marginal lines. Pronotum irrorate with brown and with traces of five light, longitudinal lines. Scutellum brown with two large orange spots between which are two broken, white, longitudinal lines, the apex light. Elytra heavily irrorate with brown, costal region lighter, dark nervures usually narrowly light margined, many cells with white spots.

External genitalia: De Long describes the female genitalia as follows: "Last ventral segment of female long, slightly keeled, posterior margin roundingly produced, pygofers constricted near base, broad and rather short." Male, last ventral segment angularly excised posteriorly; valve large, nearly as long as broad, posteriorly roundingly pointed; plates broad basally, median length less than that of the valve, spiny-margined, subacute apically, completely hiding short pygofers.

Distribution: The only Kansas record for this species is that of the five male type specimens taken in Pottawatomie county.

Hosts: De Long records sweeping this species from weeds.

Genus DELTOCEPHALUS Burm.

To this genus belong medium-sized or small species characterized chiefly by the shape of the head in which the vertex is acutely triangular, usually longer than broad, though often wider than long, disc flattened or convex and separated from the front by more or less of a distinct margin. The front is broad and the clypeus is narrowed at the tip. The elytra may be long or short, usually having five anteapical and three apical cells, and two cross nervures between the sectors. All the members of this genus are grass feeders.

Twenty-one species of this genus have been taken in Kansas and five other probable native species are included in the key.

KEY TO SPECIES.*

A. Vertex rather angularly produced, disc flat or concave, definite margin between vertex and front.
    B. Pronotum short, more than twice broader than long, elytra without a distinct appendix.
        C. Elytra moderately long, two outer apical veinlets strongly reflexed, the next one meeting the costa at nearly right angles.
            D. Pronotum with distinct, black, longitudinal lines.
                E. Vertex longitudinally lined or spotted. *bilineatus.*
                EE. Vertex transversely lined before the eyes. *albidus.*

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* Adapted from keys by Osborn & Ball, Proc. Ia. Acad. Sci., iv, p. 198, 1897, and DeLong, Tenn. St. Bd. Ent., Bul. 17, p. 42, 1916.

A. Vertex rather angularly produced—*continued.*

DD. Pronotum cinereous, without distinct black lines.

E. Face usually entirely dark.

F. Vertex without median transverse bars.

G. Elytra with large, black median spot, face entirely black. *areolatus.*

GG. Elytra without black median spot, face sometimes with light spot on apex of front. *imputans.*

FF. Vertex with median transverse bars. *visendus.*

EE. Face dark above, light below.

F. Face fuscous above, shading out below, no sharp line of demarcation; species nearly unicolorous above. *inflatus.*

FF. Face black above, light below, line of demarcation sharp. Species marked with fuscous. *reflexus.*

CC. Elytra shorter, two outer apical veinlets short, at nearly right angles to the costa, third veinlet running distinctly to the posterior margin.

D. Size larger, over 3 mm.; female segment distinctly emarginate, plates of male produced with almost parallel margins. *sayi.*

DD. Size smaller, 3 mm. or less; female segment produced or truncate, plate of male short, rapidly narrowing to acute apices. *misellus.*

BB. Pronotum longer, hardly twice broader than long, elytra long, with appendix, costal veinlets never reflexed.

C. Front with numerous black arcs; central anteapical cell distinctly constricted. *signatifrons.*

CC. Front without black arcs; central anteapical cell not distinctly constricted.

D. Elytra distinctly green.

E. Form slender; length 3 mm. or less.

F. Vertex unlined; female segment black-tipped, medially notched, valve of male large and obtuse. *minimus.*

FF. Vertex with two oblique lines; female segment unicolorous and broadly rounded, male valve smaller and acute. *parvulus.*

EE. Form stouter; length 3.25 mm. or more.

F. Vertex acutely angled, usually longer than broad. *debilis.*

FF. Vertex obtusely angled, as wide as long. *collinus.*

DD. Elytra not distinctly green, hyaline yellowish, or with nervures fuscous margined.

E. Male valve enlarged, inflated, covering all but tips of plates; female segment slightly angularly excavated. *affinis.*

A. Vertex rather angularly produced—*concluded.*

- EE. Male valve normal, less than half the length of the plates; female segment produced, more or less notched.
  - F. Yellow species; male plates not longer than broad. *oculatus.*
  - FF. Greenish species, marked with fuscous; male plates longer than broad. *sylvestris.*

AA. Vertex short, disc convex or sloping, more or less rounding to front, without well-defined margin.

- B. Black species with white points on vertex, costa yellow. *flavicosta.*
- BB. Lighter species, marked with black.
  - C. Clavus reticulated between outer claval vein and suture.
    - D. Species small, not exceeding 3.5 mm.
      - E. Vertex acutely produced in the middle; elytra longer than abdomen; male plates convexly pointed. *weedi.*
      - EE. Vertex more obtusely rounding.
        - F. Markings dull, elytra usually longer than abdomen. Male plates convexly narrowed; over 3 mm. *obtectus.*
        - FF. Markings bright, elytra not exceeding abdomen. Male plates concavely narrowed; 2.75 mm. long. *compactus.*
    - DD. Species larger, 4.5 mm. or over. *inimicus.*
  - CC. Clavus not reticulated between outer claval vein and suture.
    - D. Species large, about 5 mm. long. *osborni.*
    - DD. Species smaller, length 4 mm. or less.
      - E. Vertex with two large black spots. *punctatus.*
      - EE. Vertex with four smaller black spots.
        - F. Broader robust species; face with black arcs. *nigrifrons.*
        - FF. More slender species; face with light arcs. *sonorus.*

Deltocephalus bilineatus G. & B.

Deltocephalus bilineatus G. & B., Hemip. Colo., p. 85, 1895.
Deltocephalus bilineatus Bak., Psyche, viii, p. 115, 1897.
Deltocephalus bilineatus O. & B., Proc. Ia. Acad. Sci., iv, p. 200, 1897.
Deltocephalus bilineatus Van D., Cat. Hemip. N. A., p. 640, 1917.

Form: Rather long and narrow. Length, 3.5 to 4 mm. Vertex as long as wide, subacute at apex. Pronotum a little over twice as broad as long, anterior margin strongly convex, posterior slightly concave, lateral margins short, humeral margins long. Elytra long and narrow, exceeding abdomen, two outer apical veinlets strongly reflexed.

Color: Ashy or yellowish-white, marked with brown or black. Vertex, pronotum and scutellum with two broad longitudinal bands, a similar oblique pair laterally on pronotum and elytra, just inside the outer claval vein. Vertex white, with brown bands margined with two long black stripes and two short outer ones, also with short median stripe. Pronotum whitish with four brown stripes. Scutellum yellowish to black. Elytra whitish with white nervures margined with brown or black, especially along the suture, apically, and along the reflexed nervures, with some of the cells brownish.

External genitalia: Female, last ventral segment long, narrowed posteriorly, posterior margin deeply and angularly excavated, the sides of the notch slightly sinuate; pygofers narrowed basally, long, and covered, especially on apical half, with long bristles, equalling or only slightly exceeded by the ovipositor. Male, last ventral segment short; valve broad and roundingly produced posteriorly; plates broad, margined with long fine hairs clear to the broad, truncate, black-spotted apices; pygofers acute posteriorly, long-bristled, much exceeding plates.

Distribution: Though not yet taken in Kansas, it should be found in the northern part of the state.

Hosts: Baker took the type specimens from *Carex.*

Deltocephalus albidus O. & B.

Deltocephalus albidus O. & B., Proc. Ia. Acad. Sci., iv, p. 201, pl. 23, fig. 1, 1897.
Deltocephalus albidus Psyche, viii, p. 115, 1897.
Deltocephalus albidus Gibs. & Cog., Ohio Jl. Sci., xvi, p. 75, 1915.
Deltocephalus albidus Van D., Cat. Hemip. N. A., p. 640, 1917.

Form: More robust than *bilineatus.* Length, 4 to 5 mm. Vertex slightly longer than width between the eyes, acute apically. Pronotum a little more than twice as wide as long, convex anteriorly, distinctly concave posteriorly, humeral and posterior margins rounding into each other, lateral margins short. Elytra short or moderately long, flaring, two outer apical veinlets strongly reflexed.

Color: White; vertex with a broken median line, a preapical brown transverse line, and two narrow lines extending from ends of latter to apex. Pronotum with six brown longitudinal stripes, the middle pair extending forward on to vertex and backward across the scutellum. Elytra with sutural and apical margins and reflexed nervures lined with brown and also with two broken brown lines, one on clavus, the other extending from the humeral angle to the middle. Tergum with two pairs of stripes, the outer pair meeting in a V on the pygofers.

External genitalia: Female, last ventral segment twice as long as preceding, much narrowed posteriorly, lateral angles prominent, with a distinct median lobe which is medially notched; pygofers sparsely bristled, short and broad, equalling ovipositor. Male, last ventral segment narrower than preceding; valve triangular, broad and long, acutely pointed; plates the width of valve basally, laterally spined, apices subacute, nearly equalling the short, bristly pygofers.

Distribution: Taken in Pottawatomie and Ottawa counties.

Hosts: Taken in pastures where *Bouteloua* and *Buchloë* abound.

Deltocephalus areolatus Ball.

Deltocephalus areolatus Ball, Can. Ent., xxxi, p. 188, 1899.
Deltocephalus areolatus Osb., 20th Rept. N. Y. St. Ent., p. 520, 1905.
Deltocephalus areolatus Van D., Cat. Hemip. N. A., p. 640, 1917.

Form: Short, robust, wedge-shaped, the head forming the apex of the wedge. Length, 2.75 to 4 mm. Vertex nearly twice as long as width between the eyes, apex roundingly acute. Pronotum over twice as broad as long, lateral margins very short, humeral margins rounding into slightly concave posterior margin, anterior margin strongly convex; elytra short, flaring, two outer apical veinlets strongly reflexed.

Color: Olive-green or yellowish; vertex with two black spots apically, elytra with large dark brown spot back of cross nervure, margin of third apical cell and anterior margin of reflexed veinlets dark brown. All but tarsi and part of genitalia below, black.

External genitalia: Female, last ventral segment twice as long as preceding, strongly narrowed posteriorly, lateral angles strong, posterior margin broadly and deeply excavated with a large, medially cleft tooth which equals the lateral angles; sparsely spined pygofers broad, equalling ovipositor. Male, last ventral segment shorter than preceding, slightly concave posteriorly, valve broad, triangular, posterior margin rounding medially; plates the width of the valve basally, twice as long as valve, spiny and slightly concave margins narrowing to slightly divergent apices which are slightly exceeded by the spiny pygofers.

Distribution: Reported by Van Duzee from Kansas. Taken in Riley county.

Host: Specific host unknown. Probably a grass feeder.

Deltocephalus imputans O. & B.

Deltocephalus imputans O. & B., Proc. Dav. Acad. Sci., vii, p. 75, 1898.
Deltocephalus imputans DeL., Tenn. St. Bd. Ent., Bul. 17, p. 43, 1916.
Deltocephalus imputans Van D., Cat. Hemip. N. A., p. 640, 1917.
Deltocephalus imputans Fent., Ohio Jl. Sci., xviii, No. 6, p. 184, 1918.

Form: Wedge-shaped like *areolatus*. Length 3.5 to 4 mm. Vertex about one-third longer than basal width, acutely pointed, margin distinct. Pronotum as in *areolatus*. Elytra short, equalling abdomen, flaring, outer anteapical cell and second cross nervure sometimes wanting, two outer apical nervures strongly reflexed.

Color: Creamy yellow; vertex with two black spots apically, from which lines to ocelli and median line are reddish-brown. Elytra with anterior margin of reflexed veins and margin of third apical cell broadly black. Face black with sometimes a light spot on apex of front.

External genitalia: Female, last ventral segment half longer than preceding, narrowed posteriorly to acute lateral angles, posterior margin emarginate on either side of a wide, roundingly produced and medially notched median lobe; pygofers sparsely bristled, broad, equalling ovipositor. Male, last ventral segment about half as long as preceding, valve broad, two to three times as long as ultimate segment, subacute apically, lateral margins somewhat sinuate; plates long, sparsely bristled margins narrowed from base to divergent, rounded tips which are well exceeded by the bristled pygofers.

Distribution: Van Duzee reports this species from Kansas.

Hosts: Doctor Ball gives *Muhlenbergia* as the grass on which this species lives.

Deltocephalus visendus Crmb.

Deltocephalus visendus Crmb., Ann. Ent. Soc. Am., viii, p. 189, 1915.
Deltocephalus visendus Van D., Cat. Hemip. N. A., p. 641, 1917.

Form: That of *reflexus*. Length, 3.25 to 4.25 mm. Vertex flat, nearly one-fourth longer than width between the eyes, acutely angled. Pronotum over twice as broad as long, strongly convex anteriorly, slightly concave posteriorly, lateral margins short, humeral margins rounding into posterior margin. Elytra flaring, slightly exceeding abdomen.

Color: Pale cinereous. Vertex apically white with two black lines from which reddish lines extend to the ocelli; median line reddish, with a pair of dark median transverse bars. Pronotum with six faint, brownish longitudinal stripes. Elytra with black spots near anterior junction of claval veins and on the disc. The anterior margins of the reflexed nervures, the margin of the third apical cell and often the margins of other veins, brownish or black. Face black, becoming brownish below.

External genitalia: Female, last ventral segment twice as long as preceding, narrowed posteriorly, lateral angles acute, posterior margin emarginate on either side of a large, median, obtusely pointed and slightly notched lobe; sparsely spined pygofers broad, equalling ovipositor. Male, last ventral segment half as long as preceding; valve triangular, margins somewhat concavely narrowed to acute apex; plates about twice as long as valve, characteristic because of apices being separated by small median excavation; bristly pygofers exceeding plates and distinctly compressed from near the base.

Distribution: Taken in Douglas, Miami and Chautauqua counties.

Hosts: Swept from native grasses.

Deltocephalus inflatus O. & B.

Deltocephalus inflatus O. & B., Ia. Acad. Sci., iv, p. 202, pl. 22, fig. 2, 1897.
Deltocephalus inflatus Bak., Psyche, viii, p. 115, 1898.
Deltocephalus inflatus Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 220, 1909.
Deltocephalus inflatus Van D., Cat. Hemip. N. A., p. 640, 1917.

Form: Not as strongly wedge-shaped as *reflexus*. Length, 4.25 to 4.75 mm. Vertex slightly longer than basal width, more obtusely pointed than in *reflexus*. Pronotum over twice as broad as long, lateral margins short. Elytra longer than in *reflexus*, flaring, two outer costal veinlets strongly reflexed.

Color: Yellowish-white; vertex with white apex margined with brown and with reddish line to ocelli, with a pair of spots on either side the center and a pair near the base, light brown. Pronotum with six faint longitudinal stripes, the median ones extending across the scutellum. Elytra subhyaline, nervures white, frequently margined with brown, especially the anterior margin of the reflexed veinlets, and with black spots near middle of clavus, on the first cross vein of sectors and in third apical cell. Face fuscous above, shading gradually to light below.

External genitalia: Female, last ventral segment twice as long as preceding, strongly narrowed posteriorly, lateral angles obtuse, apex in line with central third which is suddenly produced, slightly notched medially, and sinuate and darkened on either side of the notch; pygofers sparsely spined, narrowed basally, broad and equalling ovipositor. Male, last ventral segment nearly as long as preceding; valve triangular, subacute at apex, margins concave medially; plates short, about twice the length of the valve, apices acute, margins spiny; pygofers greatly exceeding plates, but tergite inflated and pressed laterally and terminally against the pygofers.

Distribution: Taken in Pottawatomie county only.

Hosts: A grass feeder. Specific host unknown.

Deltocephalus reflexus O. & B.

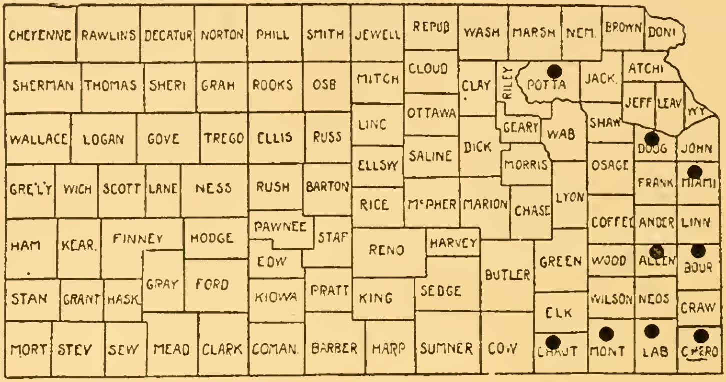
Deltocephalus reflexus O. & B., Proc. Ia. Acad. Sci., iv, p. 203, pl. 22, fig. 1, 1897.
Deltocephalus reflexus Bak., Psyche, viii, p. 115, 1897.
Deltocephalus reflexus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 44, 1916.
Deltocephalus reflexus Van D., Cat. Hemip. N. A., p. 641, 1917.
Deltocephalus reflexus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 61, 1919.

Form: Distinctly wedge-shaped. Length, 4 to 4.5 mm. Vertex half longer than wide, acutely angled. Pronotum as in preceding species except posterior margin more nearly truncate. Elytra strongly flaring, two outer costal veinlets strongly reflexed.

Color: Soiled white or yellowish; vertex with white apex encircled with dark brown, reddish-brown marginal lines to ocelli, pair of median transverse bars and two basal spots, brown. Pronotum yellowish with six faint longitudinal lines. Elytra with spot on clavus and corium, margins of veins, especially anterior margin of reflexed veins and third apical cell, brown. Face black above and light below.

External genitalia: Female, last ventral segment half longer than preceding, strongly narrowed posteriorly, posterior margin concave on either side of a notched median tooth; pygofers sparsely bristled, broad, equalling ovipositor. Male, last ventral segment three-fourths as long as preceding; valve triangular, broad, acutely pointed, spiny margined; plates a little more than twice the length of the valve, elongate, apices somewhat divergent, nearly equalling the spiny pygofers.

Distribution: Common throughout the eastern part of the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
DICK
GEARY
WAB
SHAW
DOUG
JOHN
GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
ELLSW
SALINE
MORRIS
OSAGE
FRANK
MIAMI
RICE
McPHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
GREEN
WOOD
ALLEN
BOUR
EDW
BUTLER
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
WILSON
NEOS
CRAW
ELK
MORT
STEV
SEW
MEAD
CLARK
COMAN.
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Grasses.

Deltocephalus sayi (Fh.).

(Pl. 12, figs. 7-8.)

Amblycephalus sayii Fh., Homop. N. Y. St. Cab., p. 61, 1851.
Tettigonia sayii Walk., List Homop., iv, p. 1158, 1852.
Deltocephalus sayi Uhl., Bul. U. S. Geol. Geog. Surv., iv, p. 511, 1878.
Deltocephalus sayi Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Deltocephalus sayi O. & B., Proc. Ia. Acad. Sci., iv, p. 207, pl. 23, fig. 2, 1897.
Deltocephalus sayi Osb., 20th Rept. N. Y. St. Ent., p. 519, 1905.
Deltocephalus sayi Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 84, fig. 20, 1912.
Deltocephalus sayi Osb., Me. Agr. Exp. Sta., Bul. 238, p. 117, 1915.
Deltocephalus sayi De L., Tenn. St. Bd. Ent., Bul. 17, p. 46, 1916.
Deltocephalus sayi Van D., Cat. Hemip. N. A., p. 642, 1917.
Deltocephalus sayi Fent., Ohio Jl. Sci., xviii, No. 6, p. 183, 1918.

Form: Short, robust forms, not distinctly wedge-shaped as preceding species. Length, 3.25 to 3.5 mm. Vertex a little longer than width between eyes, rather acutely pointed. Pronotum short, two and a half times as broad as long, humeral margins seemingly forming a part of the posterior margin. Elytra short and broad, almost truncate apically, exceeded by abdomen, outer costal veins not strongly reflexed.

Color: Brownish; vertex nearly reddish-brown with margins, tip, median and basal transverse lines and a median longitudinal line, light. Pronotum with six faint longitudinal lines. Elytra with lighter areas across base and a broader one across tip of clavus, the rest with the light nervures heavily margined with brown. Face light brown with heavy dark arcs.

External genitalia: Female, last ventral segment moderately long, posterior margin emarginate; broad spiny pygofers equalling or slightly exceeded by ovipositor. Male, last ventral segment as long as preceding;

valve, broad, obtusely produced posteriorly; plates broad basally then narrowed and running with parallel margins to obliquely truncate apices; margins with bristles on proximal two-thirds, exceeding the short pygofers.

Internal male genitalia: Styles very large, with large triangular process for attachment to connective, lateral margin broadly and deeply incised apically, incision bearing fine hairs forming a slender, curving apex, crenulated on extreme inner margin; connective narrow proximally, then widening, then narrowing to parallel-margined apical portion, hollowed for nearly entire length; œdagus very characteristic with broad base sending two short arms dorsad, then slightly tapering to apex where it widens and flattens out into two wings, from between which there extend dorsad two long slender processes with a pair of stout recurved spines cephalad of these.

Distribution: Taken in Douglas, Decatur and Pottawatomie counties.

Hosts: Blue grass seems to be the chief host.

Deltocephalus misellus Ball.

Deltocephalus misellus Ball, Can. Ent., xxxi, p. 191, 1899.
Deltocephalus misellus Barb., Bul. Am. Mus. Nat. Hist., xxxiii, p. 533, 1914.
Deltocephalus misellus Gibs. & Cog., Ohio Jl. Sci., xvi, p. 75, 1915.
Deltocephalus misellus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 117, 1915.
Deltocephalus misellus Van D., Cat. Hemip. N. A., p. 642, 1917.

Form: Resembling *sayi*, but smaller. Length, 2.75 to 3 mm. Vertex flat, as long as width between the eyes, obtusely angled apically. Pronotum over twice as wide as long, strongly convex anteriorly, posterior margin slightly emarginate, fusing with humeral margins, lateral margins very short. Elytra broad and short, broadly rounding apically, shorter than abdomen in female, exceeding abdomen in male.

Color: Cinereous, marked with brown; vertex white, with two oblique lines at apex whose base is joined by a brown line, two large brown spots on the disc, and two smaller ones at the base. Pronotum showing faintly four broad longitudinal lines, otherwise irregularly fuscous marked. Elytra cinereous with white nervures generally strongly margined with fuscous. Face fuscous marked with light arcs.

External genitalia: Female, last ventral segment half longer than preceding, somewhat narrowed posteriorly, posterior margin somewhat produced, especially medially; pygofers sparsely bristled, slightly exceeded by the ovipositor. Male, valve triangular, obtuse apically; plates together forming a triangle broader than long, spiny margins regularly tapering to the acute, slightly divergent apices; pygofers very short, very sparsely bristled, exceeded by the plates.

Distribution: This species has not yet been taken from this state but should be found in the northeastern portion.

Hosts: Professor Osborn reports it from Canadian blue grass.

Deltocephalus signatifrons Van D.

Deltocephalus signatifrons Van D., Trans. Am. Ent. Soc., xix, p. 305, 1892.
Deltocephalus signatifrons G. & B., Hemip. Colo., p. 89, 1895.
Deltocephalus signatifrons O. & B., Ia. Agr. Col. Exp. Sta., Bul. 34, p. 135, 1897.
Deltocephalus signatifrons Osb., Proc. Ia. Acad. Sci., iv, p. 215, pl. 25, fig. 1, 1897.
Deltocephalus signatifrons Van D., Cat. Hemip. N. A., p. 645, 1917.

Form: Males appearing rather slender, females more robust. Length, 3 to 3.5 mm. Vertex slightly sloping, broader than long, obtusely to roundingly produced apically. Pronotum less than twice as broad as long, strongly convex anteriorly, lateral margins very short, humeral margins distinct but rounding with slightly emarginate posterior margin. Elytra usually exceeding the abdomen, but only equalling it in some females, middle anteapical cell distinctly constricted.

Color: Ashy-gray tinged with fuscous; vertex slightly yellowish, with four large quadrate brown spots on the disc, a pair of smaller and darker ones at the apex and frequently a spot between the latter and the ocelli. Pronotum grayish, mottled with brown and with five faint, light, longitudinal lines. Scutellum with basal angles dark and disc irregularly mottled with brown. Elytra with nervures light, in some places milky white, and usually strongly margined with fuscous. Face heavily marked with black arcs and dots.

External genitalia: Female, last ventral segment a little longer than preceding, lateral angles prominent, posterior margin broadly excavated and bearing two prominent obtusely pointed teeth which are separated by an incision reaching about one-third of the distance to the base; pygofers broad, spiny, and equalling or slightly exceeded by the ovipositor. Male, last ventral segment about the length of the preceding; valve broad, short, broadly rounded posteriorly; plates very broad, a little over twice the length of the valve, very widely truncate apically, margined with moderately fine hairs; pygofers short, barely exceeding plates, bearing long bristles.

Distribution: Taken hitherto in four western counties, namely: Decatur, Sheridan, Wallace and Hodgeman.

Hosts: Gillette and Baker report this species from beans and alfalfa, while Osborn and Ball report it as infesting weedy places.

Deltocephalus minimus O. & B.

Deltocephalus minimus O. & B., Proc. Ia. Acad. Sci., iv, p. 211, pl. 24, fig. 4, 1897.
Deltocephalus minimus Metc., Jl. Elisha Mitchell Sci. Soc., xxxi, p. 24, 1915.
Deltocephalus minimus De L., Tenn. St. Bd. Ent., Bul. 17, p. 47, 1916.
Deltocephalus melsheimerii Van D., Cat. Hemip. N. A., p. 647, 1917.

Form: Small and slender. Length, 2.25 to 3 mm. Vertex a little longer than wide in the female, about as long as wide in the male, more rounded apically in the male. Pronotum not quite twice as broad as long, strongly convex anteriorly, lateral margins very short, long humeral margins rounding with very slightly concave posterior margin. Elytra long and narrow.

Color: Yellowish-green; disc of pronotum and basal portion of elytra darker green, distal portion of elytra lighter. Face fuscous with lighter arcs.

External genitalia: Female, last ventral segment longer than preceding, lateral margins narrowed posteriorly with slight lateral angles or rounding with posterior margin which is slightly convex, with three small median notches margined with black; pygofers bristly and long, equalling or slightly exceeded by ovipositor. Male, valve large, triangular, apex rather obtuse; plates broad, three times length of valve, regularly tapering to acute tips; pygofers long and narrow, exceeding plates, very bristly.

Distribution: Taken in Cherokee and Franklin counties.

Hosts: Grass feeders. Osborn and Ball suggest *Sporobolus* and *Stipa* as hosts.

After studying the types of this species in Professor Ball's collection, and comparing them with specimens of *Deltocephalus melsheimerii* Fh., sent him by Professor Osborn from Maine, it is impossible to agree with Mr. Van Duzee in making these species synonymous. The genitalia, both male and female, are entirely alike. *Deltocephalus minimus* has the female ultimate segment distinctly notched three times medially, and the lateral margins are distinctly narrowed posteriorly, so that the posterior margin is clearly narrower than the anterior. *Deltocephalus melsheimerii*, on the other hand, has a more truncate and unnotched posterior margin which is as wide as the anterior margin, for the lateral margins are not narrowed posteriorly, forming right angles with the posterior margin. In the male genitalia the differences are even more noticeable. In *Deltocephalus melsheimerii* the valve is shorter and more rounded posteriorly than in *Deltocephalus minimus*. The plates, however, are very characteristic. In the former they are very broad, and continue, almost parallel-margined to the broad, upturned, obtusely-pointed or truncate apices. In the latter the plates are longer, more slender, and tapering posteriorly to the acute apices which are not upturned.

Deltocephalus parvulus Gill.

Deltocephalus parvulus Gill., Colo. Agr. Exp. Sta., Bul. 43, p. 23, 1898.
Deltocephalus parvulus Van D., Cat. Hemip. N. A., p. 647, 1917.

Form: Much like preceding species. Length, 2.5 to 3 mm. Vertex slightly longer than wide in female, about as long as wide in male, subacute apically in female, more rounded in male. Vertex long, not twice as wide as long, strongly convex anteriorly, lateral margin very short, long humeral margins rounding to slightly concave, posterior margin. Elytra long and slender, exceeding abdomen.

Color: Greenish-yellow; vertex yellowish with two brown lines extending from apex to base. Pronotum yellowish-green, sometimes with two brown longitudinal lines. Scutellum yellow. Elytra yellowish-green, subhyaline, nervures brighter. Face pale fuscous with pale arcs.

External genitalia: Female, last ventral segment twice as long as preceding, narrowed posteriorly, posterior margin strongly and roundingly produced, unicolorous; pygofers long and narrow, equalling or slightly exceeded by ovipositor, sparsely bristled. Male, valve small, triangular, apex subacute, smaller and more acute than in *minimus*, plates long and narrow, spiny margined, apices acute.

Distribution: Collected in large numbers in Ottawa county.

Hosts: Professor Gillette reports this species on short prairie grasses. The writer swept them in abundance from pastures composed chiefly of *Bouteloua* and *Buchloë*.

Deltocephalus debilis Uhl.

Deltocephalus debilis Uhl., Bul. U. S. Geol. Geog. Surv., i, p. 360, 1876.
Deltocephalus melsheimeri Osb., Proc. Ia. Acad. Sci., l, pt. 2, p. 126, 1892.
Deltocephalus debilis O. & B., Proc. Ia. Acad. Sci., iv, p. 210, pl. 23, fig. 2, 1897.
Deltocephalus debilis Osb., 20th Rept. N. Y. St. Ent., p. 520, 1905.
Deltocephalus debilis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 49, 1916.
Deltocephalus debilis Van D., Cat. Hemip. N. A., p. 646, 1917.
Deltocephalus debilis Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 65, 1919.

Form: Larger and more robust than two preceding species. Length, 3 to 4.75 mm. Vertex longer than wide, or width equal to length, acutely angled. Pronotum not over twice as broad as long, strongly convex anteriorly, lateral margins very short, humeral margins rounding into slightly concave posterior margin. Elytra varying in length, sometimes shorter, usually longer than abdomen.

Color: Greenish; vertex, anterior portion of pronotum and scutellum yellow, median line of vertex and ocelli black. Elytra subhyaline with veins light. Face brownish with pale arcs and median line.

External genitalia: Female, last ventral segment long, posterior margin rounded with narrow, deep, median notch or sometimes nearly truncate with a shallow notch between two small lobes; pygofers broad, broadest at middle, and sparsely spined, equalling or slightly exceeded by ovipositor. Male, last ventral segment shorter than preceding, valve roundingly produced posteriorly; plates together as broad at base as long, margins spined, each with a black spot, apices obtuse, exceeded by the acutely pointed and long-bristled pygofers.

Distribution: Collected in Douglas and Pottawatomie counties.

Hosts: Found on low grounds and in wooded regions.

Deltocephalus collinus Boh.

Deltocephalus collinus Boh., Kong. Vet. Akad. Handl. for 1850, p. 261.

Deltocephalus aridellus Boh., Kong. Vet. Akad. Handl. for 1850, p. 263.

Deltocephalus collinus Fieb., Verh. Zoöl.-Bot. Ges. Wien., xix, p. 216, pl. 6, fig. 42, 1869.

Deltocephalus collinus Edw., Hemip. Homop. Brit. Isds., p. 264, pl. 29, figs. 4, 5, 1896.

Deltocephalus collinus O. & B., Proc. Dav. Acad. Sci., vii, p. 80, 1898.

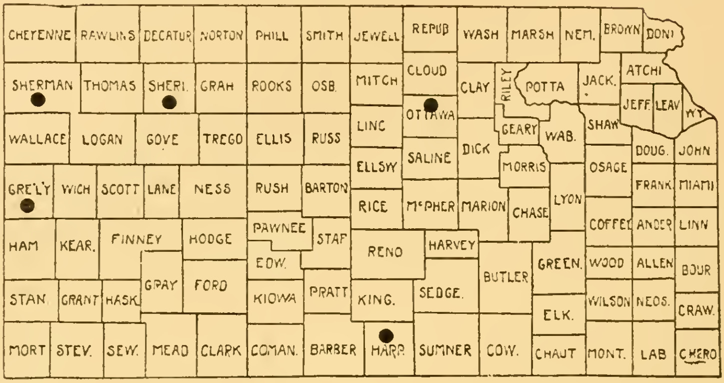
Deltocephalus collinus Van D., Cat. Hemip. N. A., p. 647, 1917.

Form: Robust and like *affinis*. Length, 3.25 to 4 mm. Vertex about as long as wide, sometimes wider, rather obtusely angled. Pronotum less than twice as broad as long, anterior margin strongly convex, lateral margins short, humeral margins rounding into slightly concave posterior margin. Elytra narrow, either short, reaching to base of penultimate segment and diverging from the tip of the clavus, or long in some females, exceeding the abdomen.

Color: Greenish-yellow, practically unicolorous; vertex sometimes marked with light brown on either side of a light stripe enclosing the dark, median, impressed line. Pronotum sometimes with signs of six fuscous longitudinal lines. Elytra with light nervures, tip hyaline, abdomen sometimes marked with fuscous stripes. Face fuscous marked with light median line and arcs.

External genitalia: Female, last ventral segment longer than preceding, narrowed posteriorly, posterior margin seemingly with five lobes, the two outer light colored ones small, and separated shallowly from the small black lobes next to them, and these in turn separated by a deeper excavation from the light colored median lobe; pygofers narrowed basally, long and narrowed, bristly, slightly exceeding the ovipositor. Male, last ventral segment two-thirds as long as preceding; valve large, nearly twice as wide as long, obtusely angulated posteriorly; plates broad, margins convex till near the apex, then concavely narrowing to the obtuse apices which are slightly exceeded by the spiny pygofers.

Distribution: Fairly common in western portion of the state, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
DICK
GEARY
WAB.
SHAW
DOUG.
JOHN
ELLSW
SALINE
MORRIS
OSAGE
GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK.
MIAMI
COFFEE
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FINNEY
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PAWNEE
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HARVEY
EDW.
GREEN.
WOOD
ALLEN
BOUR
STAN
GRANT
HASK.
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
BUTLER
ELK.
WILSON
NEOS.
CRAW.
MORT
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Osborn and Ball give *Sporobolus* as the host.

Deltocephalus affinis G. & B.

(Pl. 12, figs. 5-6.)

Deltocephalus affinis G. & B., Hemip. Colo., p. 84, 1895.
Deltocephalus melsheimerii Van D., Psyche, v, p. 390, 1890.
Deltocephalus debilis Osb., Ia. Agr. Col. Exp. Sta., Bul. 13, p. 100, 1891.
Deltocephalus debilis Osb., U. S. Dept. Agr., Div. Ent., Bul. 30, p. 45, 1893.
Deltocephalus melsheimerii O. & B., Proc. Ia. Acad. Sci., iv, p. 211, pl. 24, fig. 1, 1897.
Deltocephalus affinis Bak., Psyche, viii, p. 118, 1897.
Deltocephalus affinis Osb., 20th Rept. N. Y. St. Ent., p. 522, 1905.
Deltocephalus affinis Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 82, fig. 18, 1912
Deltocephalus affinis Osb., Me. Agr. Exp. Sta., Bul. 238, p. 122, 1915.
Deltocephalus affinis Van D., Cat. Hemip. N. A., p. 648, 1917.
Deltocephalus affinis Fent., Ohio Jl. Sci., xviii, No. 6, 184, 1918.

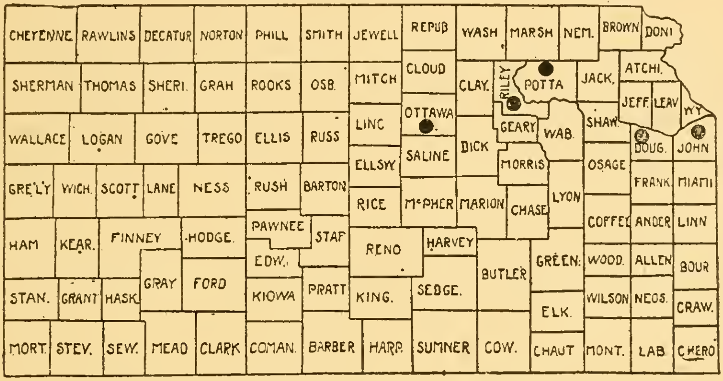
Form: Length, 3 to 4 mm. Vertex wider than long, obtusely pointed. Pronotum a little longer than the vertex, lateral margins short, humeral margins distinctly angled with the slightly emarginate posterior margin. Elytra long, barely exceeding the abdomen sometimes, and again greatly exceeding it.

Color: Pale ashy-green, usually marked with fuscous. Vertex and pronotum often unicolorous or mottled with fuscous, the latter sometimes showing five pale longitudinal stripes. Elytra often unicolorously greenish-brown, sometimes with nervures heavily bordered with fuscous. Face fuscous with light median line and arcs.

External genitalia: Female, last ventral segment long, slightly narrowed posteriorly, posterior margin broadly and angularly emarginate; pygofers spiny on distal half, broad, equalling ovipositor. Male, last ventral segment as long as preceding, valve very characteristic, large and inflated, concealing all but the obtuse and divergent apices of the short plates; pygofers very short, each with a tuft of long bristles.

Internal male genitalia: Styles with a very large and characteristic projection to meet the connective, main body of about uniform diameter till near the apex, then excavated laterally, forming an outwardly curved and knobbed apex, connective very long and slender, notched basally for nearly one-half its length; œdagus with a pair of lateral, dorsally projected processes, and a longer median and terminal process.

Distribution: Very abundant wherever its host occurs. The following map shows counties in which it has been taken:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
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THOMAS
SHERI.
GRAH
ROOKS
OSB.
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CLOUD
CLAY.
RILEY
POTTA
JACK.
ATCHI.
JEFF.
LEAV
WY.
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW.
DOUG.
JOHN
SALINE
DICK
MORRIS
OSAGE
ELLSW
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
FRANK.
MIAMI
RICE
McPHER
MARION
CHASE
LYON
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WILSON
NEOS.
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SEW.
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CLARK
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BARBER
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SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Blue grass.

Deltocephalus oculatus O. & B.

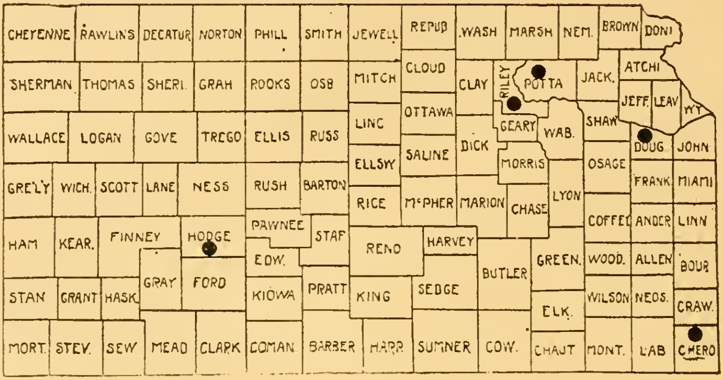
Deltocephalus oculatus O. & B., Ia. Acad. Sci., iv, p. 212, pl. 23, fig. 4, 1897.
Deltocephalus oculatus De L., Tenn. St. Bd. Ent., Bul. 17, p. 48, 1916.
Deltocephalus oculatus Van D., Cat. Hemip. N. A., p. 648, 1917.
Deltocephalus oculatus Fent., Ohio Jl. Sci., xviii, No. 6, p. 184, 1918.

Form: Like *affinis*, smaller. Length, 3.5 mm. Vertex slightly longer than width between eyes, obtusely pointed. Pronotum not twice as broad as long, lateral margins short. Elytra long and narrow, much exceeding abdomen.

Color: Distinctly yellow, face marked with fuscous arcs. Elytra not as bright yellow as vertex, pronotum and scutellum.

External genitalia: Female, last ventral segment about length of preceding, lateral angles acute, middle third of posterior margin truncately produced, dark, and thin lobed; pygofers bristly, broad, equalling ovipositor. Male, valve broad, triangular, acute apically; plates broad at base, much narrowed apically to the slender, produced apices; pygofers long and very acute at apices, exceeding plates and spiny.

Distribution: As shown by the map, this species is seemingly more abundant in the eastern part of the state.



Hosts: Osborn and Ball give *Andropogon scoparius* as a host, while De Long records it on *Aristida gracilis.*

Deltocephalus sylvestris O. & B.

Deltocephalus sylvestris O. & B., Proc. Ia. Acad. Sci., iv, p. 213, pl. 25, fig. 4, 1897.
Deltocephalus sylvestris Osb., Me. Agr. Exp. Sta., Bul. 238, p. 119, 1915.
Deltocephalus sylvestris DeL., Tenn. St. Bd. Ent., Bul. 17, p. 49, 1916.
Deltocephalus sylvestris Van D., Cat. Hemip. N. A., p. 49, 1917.
Deltocephalus sylvestris Fent., Ohio Jl. Sci., xviii, No. 6, p. 184, 1918.

Form: More slender than *oculatus.* Length, 3.5 mm. Vertex distinctly longer than wide, acutely pointed. Pronotum long, with short lateral margins and distinctly emarginate posterior margin. Elytra long and narrow, distinctly exceeding the abdomen.

Color: Greenish-yellow marked with fuscous; vertex greenish-yellow, with two brownish lines from apex towards each eye and with a dark median line. Pronotum with traces of five longitudinal lines; elytra greenish, nervures light, sometimes margined with fuscous. Face fuscous with median line and arcs pale.

External genitalia: Female, last ventral segment narrowed posteriorly, short, except for long median third which is strongly and abruptly produced and black. Male, valve broad, apex obtusely angulated; plates very broad, three times the length of valve, spines divergent and acute, margins spiny; bristly pygofers slightly exceeding plates.

Distribution: Taken only in Douglas and Cherokee counties.

Hosts: Osborn and Ball report this species from blue grass in wooded areas.

Deltocephalus flavicosta Stal.

(Pl. 12, figs. 3-4.)

Jassus (*Deltocephalus*) *flavicosta* Stal, Rio Jan. Hemip., ii, p. 53, 1862.
Deltocephalus flavicosta Van D., Can. Ent., xxiv, p. 116, 1892.
Deltocephalus retrorsus Uhl., Proc. Zoöl. Soc. Lond. for 1895, p. 78.
Deltocephalus harrisi (Fh. MS.) in collections.
Deltocephalus flavocostatus O. & B., Proc. Ia. Acad. Sci., iv, p. 217, 1897.
Deltocephalus flavicosta Bak., Psyche, viii, p. 117, 1897.
Deltocephalus retroversus (Uhl. MS.) Smith, Cat. Ins. N. J., edn. 2, p. 95, 1900.
Deltocephalus flavocostatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 49, 1916.
Deltocephalus flavicosta Van D., Cat. Hemip. N. A., p. 645, 1917.
Deltocephalus flavicosta Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 64, 1919.

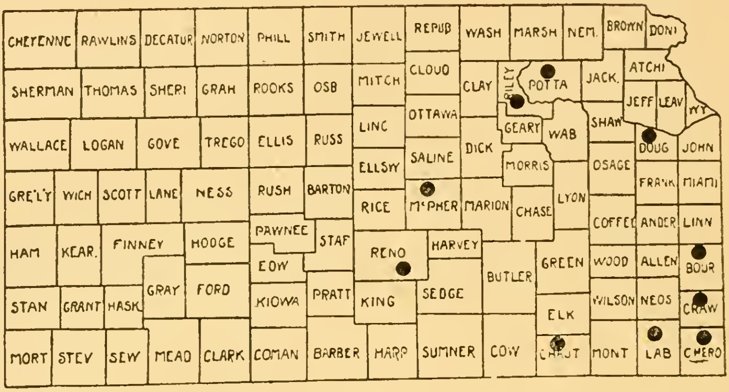
Form: Length, 2.5 to 3.5 mm. Vertex distinctly wider than long, anterior margin nearly round, disc convex and sloping, without well-developed margin. Pronotum long, strongly convex anteriorly, lateral margins very short, humeral margins long and rounding with slightly emarginate posterior margin. Elytra long and narrow, exceeding the abdomen.

Color: Dark brown to black; vertex with four apical spots in form of a square, three against each eye, and two at middle of posterior margin, yellow. Pronotum with five yellow spots on anterior portion and five faint longitudinal lines. Elytra very characteristic because of the yellow two-thirds of costal area and two outer costal veinlets sometimes broadly light.

External genitalia: Female, last ventral segment twice as long as preceding, narrowed posteriorly, posterior margin roundingly produced and sometimes with a small median notch; pygofers sparsely spined, broad and short, exceeded by the ovipositor. Male, last ventral segment as long as preceding; valve broad, triangular, margins slightly concave to obtuse or rounded apex; plates broad at base, longer than valve, margins with few spines, narrowing to acute apices which exceed the sparsely spined short pygofers.

Internal male genitalia: Styles acute at either end, apically toothed on inner margin and sending long, parallel-sided processes from near their middle length seemingly direct to the œdagus, which is semicircular when viewed laterally, and broad till near the apex, then greatly narrowed, but ending obtusely.

Distribution: Common throughout the eastern part of the state. Often attracted to lights. The following map shows counties furnishing specimens:



Hosts: Taken on weeds and grasses.

Deltocephalus weedi Van D.

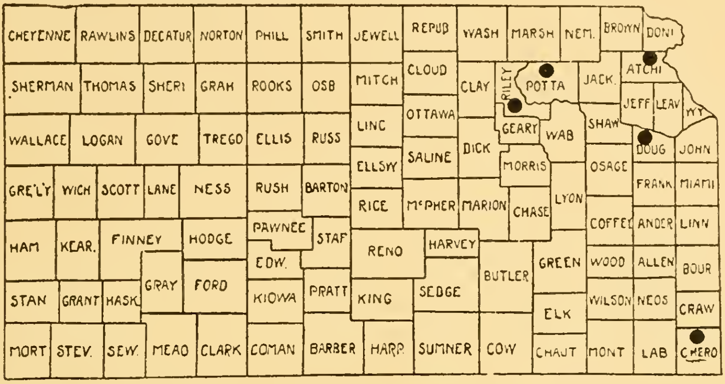
Deltocephalus weedi Van D., Trans. Am. Ent. Soc., xix, p. 306, 1892.
Deltocephalus weedi O. & B., Proc. Ia. Acad. Sci., iv, p. 216, pl. 25, fig. 2, 1897.
Deltocephalus weedi DeL., Tenn. St. Bd. Ent., Bul. 17, p. 52, 1916.
Deltocephalus weedi Van D., Cat. Hemip. N. A., p. 643, 1917.
Deltocephalus weedi Fent., Ohio Jl. Sci., xviii, No. 6, p. 184, 1918.
Deltocephalus weedi Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 62, 1919.

Form: Small and robust. Length, 3 mm. Vertex a little longer than wide, rather acutely pointed, at least more acute than in two following species. Pronotum long, not over twice as broad as long, strongly convex anteriorly, lateral margins very short, humeral margins long, broadly rounding with slightly concave posterior margin. Elytra slightly longer than the abdomen, somewhat flaring, the clavus well reticulated, the central anteapical cell divided.

Color: Brown; vertex with two triangular fuscous, apical spots, a black spot above each ocellus, a medially widened, transverse, broad band on the disc, with a pair of light fuscous basal spots and a dark median longitudinal line. Pronotum with five white longitudinal lines, two large fuscous apical spots and irregular fuscous spots posteriorly, parallel to anterior margin. Scutellum with dark basal angles. Elytra with nervures broadly white and uniformly bordered with fuscous, sometimes the cells entirely fuscous. Face black with white arcs.

External genitalia: Female, last ventral segment one-third longer than preceding, posterior margin broadly and roundly slightly concave; pygofers broad, bristled on distal half, slightly exceeded by the ovipositor. Male, last ventral segment as long as preceding, posterior margin distinctly concave, valve broad, broadly rounded posteriorly; plates together half broader than long, spiny margins rounding to obtuse apices; pygofers broad and short, equalling or slightly exceeding plates, and with long bristles.

Distribution: Found in the eastern part of the state, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
DICK
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
MORRIS
OSAGE
GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
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KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
COFFE
ANDER
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EDW.
BUTLER
GREEN
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ALLEN
BOUR
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
WILSON
NEOS
CRAW
ELK
MORT
STEV.
SEW.
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Taken when sweeping grasses and weeds.

Deltocephalus obtectus O. & B.

Deltocephalus obtectus O. & B., Proc. Dav. Acad. Sci., vii, p. 78, 1898.
Deltocephalus obtectus Osb., 20th Rept. N. Y. St. Ent., p. 521, 1905.
Deltocephalus obtectus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 118, 1915.
Deltocephalus obtectus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 53, 1916.
Deltocephalus obtectus Van D., Cat. Hemip. N. A., p. 643, 1917.
Deltocephalus obtectus Lathr., S. C. Agr. Col., Bul. 199, p. 63, 1919.

Form: Resembles *weedi,* slightly larger. Length, 3 to 3.5 mm. Vertex slightly wider than long, disc sloping and broadly rounding with front, vertex distinctly more obtuse than in *weedi.* Pronotum about the length of vertex, lateral margins very short. Elytra usually exceeding abdomen, flaring, clavus reticulated, central anteapical cell divided.

Color: Light gray marked with fuscous, duller colored than either *weedi* or *compactus.* Vertex whitish or yellowish, two brown dashes at apex, two brown curved lines outside these, a black spot inside each ocellus, back of these a dark transverse band on each side, from whose inner end short dark lines run back parallel to the dark median line, and with two large brown basal spots. Pronotum with large dark spots back of each eye, other smaller ones parallel with anterior margin, and with faint indications of the five longitudinal stripes. Scutellum with basal angles dark and often bearing a pair of dots on disc. Elytra with nervures broadly white and more or less margined with fuscous, with black spots on clavus, corium, and then on distal half of costal margin. Face brown with light arcs.

External genitalia: Female, last ventral segment consisting of two membranes, the lateral margins only of the inner one visible from under the outer membrane which is about half as long as it is wide, much narrowed to slightly rounded nearly truncate posterior margin; pygofers broad, distally spined and equalling the ovipositor. Male, last ventral segment as long as preceding, distinctly shortened medially by the broadly rounded excavation of the posterior margin; valve large, margins distinctly concave medially and then rounding to obtuse apex; plates broad, spiny margins quickly narrowing to the attenuate and acute tips; pygofers densely bristled, their acute tips exceeding the plates.

Distribution: Taken in Cherokee county only.

Hosts: De Long reports this species from small grasses.

Deltocephalus compactus O. & B.

Deltocephalus compactus O. & B., Proc. Ia. Acad. Sci., iv, p. 217, pl. 25, fig. 3, 1897.
Deltocephalus compactus Osb., 20th Rept. N. Y. St. Ent., p. 521, 1905.
Deltocephalus compactus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 52, 1916.
Deltocephalus compactus Van D., Cat. Hemip. N. A., p. 643, 1917.
Deltocephalus compactus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 63, 1919.

Form: Much like *weedi.* Length, 2.75 mm. Vertex with length equalling width or slightly longer, disc sloping and roundingly meeting front, quite obtuse apically. Pronotum as in *obtectus.* Elytra short, broad, sometimes nearly equalling abdomen, sometimes exceeding it, clavus reticulated, central anteapical cell divided.

Color: Very much like *weedi,* brown; vertex yellowish, with ocelli, a pair of spots inside them and a pair at apex, black, a large broad pair light brown and curved marginally, a pair of transverse median and median longitudinal lines, black. Pronotum brown with the five faint longitudinal lines. Scutellum with basal angles and two spots on disc, dark. Elytra brown with nervures broadly light and usually heavily margined with fuscous. Face black with light arcs.

External genitalia: Female, last ventral segment consisting of two membranes as in *obtectus,* the inner deeply and circularly emarginate behind, nearly covered by the outer membrane which is twice as broad as long, with its posterior margin roundingly and medially produced; pygofers broad, distally spined, exceeded by the ovipositor. Male, last ventral segment as long as preceding except medially, due to broad and angular excavation of the posterior margin; valve small, posterior margin slightly rounded; plates broad at base, but with spiny margins concavely narrowed to attenuated and acute apices, which exceed the short, bristly pygofers.

Distribution: Taken in Pottawatomie county.

Hosts: Osborn and Ball report this species from *Sporobolus hookeri;* De Long reports it as abundant on *Aristida gracilis.*

Deltocephalus inimicus (Say).

(Pl. 12, figs. 1-2.)

Jassus inimicus Say, Jl. Acad. Nat. Sci. Phila., vi, p. 305, 1831; Compl. Writ., ii, p. 382.
Amblycephalus inimicus Fh., Homop. N. Y. St. Cab., p. 61, 1851.
Tettigonia inimica Walk., List Homop., iv, p. 1158, 1852.
Jassus 6-punctatus Prov., Nat. Can., iv, p. 378, 1872.
Jassus inimicus Forbes, 14th Rept. Ill. St. Ent., pp. 22, 67, 1884.
Deltocephalus inimicus Van D., Can. Ent., xxi, p. 11, 1889.
Deltocephalus inimicus Osb., Ia. St. Agr. Soc., Rept. for 1892, p. 687.
Deltocephalus inimicus Osb., Insect Life, v, p. 113, 1892.
Deltocephalus inimicus Osb., U. S. Dept. Agr., Div. Ent., Bul. 30, p. 45, 1893.
Deltocephalus inimicus O. & B., Proc. Ia. Acad. Sci., iv, p. 215, pl. 24, fig. 3, 1897.
Deltocephalus inimicus Osb., 20th Rept. N. Y. St. Ent., p. 523, 1905.
Deltocephalus inimicus Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 72, fig. 11, 1912.
Deltocephalus inimicus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 123, 1915.
Deltocephalus inimicus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 51, 1916.
Deltocephalus inimicus Van D., Cat. Hemip. N. A., p. 644, 1917.
Deltocephalus inimicus Fent., Ohio Jl. Sci., xviii, No. 6, p. 184, 1918.

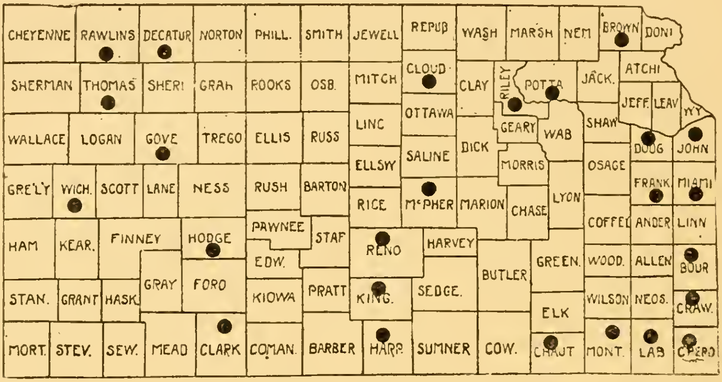
Form: A large, fairly robust species. Length, 2.75 to 5 mm. Vertex distinctly wider than long, disc slightly concave and rounding with front, very obtusely or roundingly angulate apically. Pronotum long, not twice as broad as long, lateral margins very short. Elytra long and rather narrow, exceeding the abdomen, clavus reticulate, middle anteapical cell constricted and divided.

Color: Grayish or light fuscous marked with brown. Vertex whitish or yellowish in light forms, fuscous in dark ones, with two small apical spots, a pair of large round black ones before the eyes and between and behind these a pair of smaller fuscous spots. Pronotum with two large black spots on anterior margin, sometimes others near anterior border, and with five faint, longitudinal, light lines. Scutellum with black basal angles. Elytra with the nervures broadly light, bordered with fuscous, especially in the apical region. Face fuscous with light median line and arcs. The color of this species varies very greatly from almost unmarked forms to very dark ones. The three pairs of spots, however, on vertex, pronotum and scutellum, are quite constant and thus readily distinguish the species.

External genitalia: Female, last ventral segment about as long as preceding, composed of two membranes, the inner broadly excavated posteriorly, only the rounded, lateral angles showing from under the outer membrane, which is suddenly narrowed posteriorly and terminates in a three-lobed posterior margin, which is about half the width of the broad anterior margin; spiny pygofers long and narrow, equalling or only slightly exceeded by ovipositor. Male, last ventral segment as long as preceding, posterior margin roundingly emarginate; valve short, triangular, apex obtuse, margins slightly concave; plates nearly as broad as valve at base, spiny margins concavely narrowed to attenuate and acute apices; pygofers broad, apically obtuse, sparsely spined, slightly exceeding plates.

External male genitalia: Styles triangular, with a long process to connective, lateral margin with a small, but distinct notch preapically, apex obtuse and granulated; connective flat, with middle portion cut away; œdagus long and robust, heavier basally, sinuate to obtusely rounded bifid apex, with a slightly chitinized basal, dorsally projecting process for attachment to the base of the anal tube.

Distribution: One of the commonest species as shown by the following map. Sometimes occurs in swarms at lights.


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL.
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JEWELL
REPUB
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MARSH
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DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
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CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
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PAWNEE
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NEOS.
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MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Blue grass chiefly, among many grasses and weeds. Osborn records it as injurious to wheat and oats also. One of the most destructive of our leaf hoppers.

Deltocephalus osborni Van D.

Deltocephalus osborni Van D., Trans. Am. Ent. Soc., xix, p. 304, 1892.
Athysanus osborni O. & B., Proc. Ia. Acad. Sci., iv, p. 220, 1897.
Athysanus osborni O. & B., Ohio Nat., ii, p. 249, pl. 17, fig. 4, 1902.
Athysanus osborni Osb., 20th Rept. N. Y. St. Ent., p. 527, 1905.
Ahtysanus osborni Kirk., Haw. S. P. A., Exp. Sta. Bul., iii, p. 58, 1907.
Deltocephalus osborni Van D., Cat. Hemip. N. A., p. 649, 1917.

Form: Large and robust. Length, 4.5 to 5.5 mm. Vertex about one and a half times as wide as long, disc flat, rounding with front, apex obtusely or roundingly angled. Pronotum short, over twice as wide as long, lateral margins very short. Elytra usually longer than abdomen, sometimes shorter, flaring, clavus not reticulate, two cross nervures between the sectors, middle anteapical cell divided.

Color: Almost uniformly straw- or tawny-yellow; vertex with four black marginal spots, the middle ones larger. Pronotum with five pale longitudinal lines. Elytra with light nervures, often margined with fuscous. Face with pale median line and arcs.

External genitalia: Female, last ventral segment composed of two membranes, the rounded lateral corners of the deeply excavated inner one showing at the sides of the basally broad, posteriorly much narrowed outer membrane whose posterior margin is then lobed, the middle one being smaller than the lateral lobes; pygofers rather narrow, broadest at the middle, slightly exceeded by the ovipositor, and spined on distal half. Male, last ventral segment as long as preceding, posterior margin concave; valve very small, rounded posteriorly; plates broadly triangular, acute at tips, few spines on margins, exceeded by the basally broad, acutely-tipped, long bristled pygofers.

Distribution: Collected in Douglas and Pottawatomie counties.

Hosts: Van Duzee took this species from "grass and weeds near the borders of a low, swampy wood."

Deltocephalus punctatus (O. & B.).

Athysanus punctatus O. & B., Proc. Dav. Acad. Sci., vii, p. 94, 1898.

Deltocephalus punctatus Van D., Univ. Calif. Publ., Div. Ent., Tech. Bul., i, p. 249, 1916.

Deltocephalus punctatus Van D., Cat. Hemip. N. A., p. 650, 1917.

Form: Short and rather robust. Length, 2.5 to 3.5 mm. Vertex slightly wider than long, disc sloping, apex obtuse. Pronotum longer than vertex, not twice as broad as long, lateral margins very short, humeral margins long, rounding with slightly emarginate posterior margin. Elytra long and narrow, exceeding abdomen and overlapping apically, or short and broad, reaching sixth abdominal segment, venation indistinct.

Color: Practically uniformly brown; vertex with two large black spots, dark median longitudinal line and ocelli and two apical spots reddish. Black abdomen showing through elytra.

External genitalia: Female, last ventral segment very long, sides broadly rounded to truncate posterior margin which has a slightly excavated median portion; pygofers broad apically, spiny, equalling or slightly exceeded by the ovipositor. Male, last ventral segment shorter than preceding, slightly concave posteriorly; valve very broad, broadly rounded posteriorly, three times as broad as long; plates broad basally, spiny margins concavely narrowing to acute tips, two and one-half times the length of the valve; pygofers broad at base, acute and long-bristled apically, equalling the plates.

Distribution: This species has not yet been taken in the state but should occur here, at least in the northeastern portion.

Hosts: Osborn and Ball took the type specimen on *Sporobolus*.

Deltocephalus balli Van D.

Deltocephalus balli Van D., Check List Hemip., p. 71, 1916.
Deltocephalus nigrifrons Van D., Trans. Am. Ent. Soc., xxi, p. 293, 1894.
Deltocephalus nigrifrons O. & B. Proc. Ia. Acad. Sci., iv, p. 218, 1897 (in part).
Deltocephalus nigrifrons Bak., Psyche, viii, p. 116, 1897.
Deltocephalus nigrifrons Osb., Me. Agr. Exp. Sta., Bul. 238, p. 122, 1915.
Deltocephalus nigrifrons DeL., Tenn. St. Bd. Ent., Bul. 17, p. 50, 1916.
Deltocephalus balli Van D., Cat. Hemip. N. A., p. 650, 1917.
Deltocephalus balli Fent., Ohio Jl. Sci., xviii, No. 6, p. 184, 1918.

Form: Length, 2.5 to 4 mm. Vertex over half wider than long, sloping, broadly rounding with front, obtusely angulated or broadly rounding apically. Pronotum distinctly longer than vertex, lateral margins very short, humeral margins long. Elytra long and narrow, much exceeding abdomen.

Color: Yellowish-green. Vertex yellowish with row of apical black spots. Pronotum showing five pale stripes. Scutellum with basal angles and apex reddish, and the transverse impressed line black. Elytra with light nervures, cells often fuscous. Face almost black with coalescing arcs.

External genitalia: Female, last ventral segment longer than preceding, narrowed posteriorly, posterior margin broadly emarginate; pygofers long and broad, broadest at middle, spined on distal half, nearly equalling ovipositor. Male, last ventral segment wider than preceding, concave posteriorly; valve broad but short, rounded posteriorly; plates broad at base, spined margins tapering to acute apices; pygofers bearing long spines, acute, and exceeding plates apically.

Distribution: Records are at hand only from Riley county, but it probably occurs well over the state.

Hosts: Grasses and weeds. De Long records it on wheat and rye.

Deltocephalus sonorus Ball.

Deltocephalus sonorus Ball, Can. Ent., xxxii, p. 344, 1900.
Deltocephalus sonorus Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 220, 1909.
Deltocephalus sonorus Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 79, 1912.
Deltocephalus sonorus Van D., Cat. Hemip. N. A., p. 651, 1917.

Form: Like *balli* but more slender. Length, 3.25 mm. Vertex distinctly broader than long, sloping, broadly, rounded apically. Pronotum distinctly longer than vertex, lateral margins very short, humeral margins long. Elytra long and narrow, venation distinct.

Color: Fuscous; vertex pale yellow with six marginal black spots, the middle ones larger than the others, and back of each spot a light brown spot on disc. Pronotum greenish-yellow with five light longitudinal lines. Elytra subhyaline, nervures light, often margined with fuscous. Face fuscous with light median line and arcs.

External genitalia: Female, last ventral segment half longer than preceding, lateral margins narrowed posteriorly, posterior margin slightly emarginate medially; pygofers rather narrow and long, spiny on distal half, equalling the ovipositor. Male, last ventral segment as long laterally as preceding, but with posterior margin concave; valve broad but short, rounded broadly posteriorly; plates broad basally, spined margins tapering to acute tips; pygofers exceeding plates, armed with a few stout and many fine bristles.

Distribution: Taken in Pottawatomie county only.

Hosts: Osborn reports it as occurring on annual grasses.

Genus LONATURA O. & B.

The members of this genus have a conical head, over three times as wide across the eyes as the length of the vertex, which is obtusely angled. The pronotum is short, scarcely as long as the vertex, only slightly emarginate posteriorly, covering base of elytra and scutellum in brachypterous forms. Elytra with obscure venation and only two anteapical cells, long and narrow, with large appendix, or short and broad, covering only second abdominal segment.

At least three species of this genus should occur in Kansas, only one, however, having yet been taken.

KEY TO SPECIES.

A. Forms small, less than 3 mm. *catalina.*
AA. Forms larger, 3 mm. or over.
  B. Forms large, elytra covering only first two abdominal segments and each with at least one black spot. *noctivaga.*
  BB. Forms smaller, elytra longer, covering all but two last segments of abdomen and without spots. *nebulosa*

Lonatura catalina O. & B.

Lonatura catalina O. & B., Proc. Dav. Acad. Sci., vii, p. 83, pl. 4, fig. 2, 1898.
Lonatura catalina DeL., Tenn. St. Bd. Ent., Bul. 17, p. 93, 1916.
Lonatura catalina Van D., Cat. Hemip. N. A., p. 651, 1917.
Lonatura catalina Fent., Ohio Jl. Sci., xviii, No. 6, p. 184, 1918.

Form: Very small, robust. Length of brachypterous form, 2.75 mm. Macropterous females slightly larger than macropterous males, vertex about as long as wide, sloping, broadly rounding to front, obtuse apically, whole surface distinctly granulose. Pronotum shorter than vertex, anterior margin strongly convex, lateral margins short, humeral margins distinct, broadly rounding with slightly emarginate posterior margin. Scutellum large. Elytra long and narrow, exceeding abdomen. Brachypterous forms have a slightly longer head, very short truncate elytra, the pronotum seemingly covering the base of the elytra and the scutellum, the latter appearing small, the abdomen of the male being shorter and more robust than that of the female.

Color: Macropterous females have yellowish vertex, pronotum, scutellum and elytra greenish-gray. Macropterous males have a yellow vertex, pronotum and scutellum yellowish-brown and elytra deep, smoky-brown. Brachypterous females are uniformly orange-yellow, except for dark eyes and ocelli. Brachypterous males of same color as brachypterous females, or dark, with vertex, pronotum and scutellum a yellowish-brown, elytra smoky-brown, and abdomen brownish-black.

External genitalia: Female, last ventral segment short, broad, slightly emarginate posteriorly and with a small, median, bilobed process; pygofers broad, slightly exceeded by black ovipositor, bristled apically. Male, last ventral segment about length of preceding, emarginate posteriorly; valve small, rounded posteriorly; plates broad basally, concavely narrowed to attenuate and acute tips which exceed the short, bristly pygofers.

Distribution: Though not yet reported from Kansas, this species surely occurs in the state.

Hosts: Osborn and Ball report it from *Sporobolus.* De Long took it in great numbers on *Aristida gracilis.*

Lonatura noctivaga Ball.

Lonatura noctivaga Ball, Can. Ent., xxxii, p. 342, 1900.
Lonatura noctivaga Van D., Cat. Hemip. N. A., p. 652, 1917.

Form: Large and robust. Length, 4 to 5.5 mm. Vertex at least one-fourth wider than long, sloping and broadly rounding with front, apex obtusely angled. Pronotum short, scarcely as long as vertex, anterior margin broadly convex, lateral margins long, humeral margins long, scarcely angled with the somewhat emarginate posterior margin. Elytra short and broad, obliquely truncate, covering first two abdominal segments, venation obscure and reticulate.

Color: Creamy-yellow; vertex with four large marginal black spots, the outer the larger, with a faint transverse band behind the latter, back of which may be irregular brownish spots, and with a dark median line. Pronotum with five light longitudinal lines. Elytra with nervures light, one or two black spots on posterior margin and often one or more between these and the scutellum. Abdomen dark olive with creamy stripes.

External genitalia: Female, last ventral segment one-third longer than preceding, strongly narrowed posteriorly, lateral angles broadly rounded, posterior margin twice notched, with a small median lobe; pygofers long and narrow, narrowed basally, sparsely spined, exceeded by the very long ovipositor. Male, last ventral segment longer than the preceding, posterior margin concave; valve very small, rounded posteriorly; plates broad and long, spiny margins tapering to acute tips which are slightly exceeded by the short, sparsely spined pygofers.

Distribution: This species has not yet been reported from Kansas but should occur in the northeastern portion of the state.

Hosts: Unknown.

Lonatura nebulosa Ball.

Lonatura nebulosa Ball, Can. Ent., xxxii, p. 341, 1900.
Lonatura nebulosa Van D., Cat. Hemip. N. A., p. 652, 1917.

Form: Distinctly smaller than *noctivaga*. Length, 3 to 3.5 mm. Vertex nearly one-third wider than long, sloping, broadly rounding with front, obtuse apically. Pronotum longer than vertex, strongly convex anteriorly, lateral margins short, humeral margins distinctly angulate with the slightly emarginate posterior margin. Elytra short, covering all but two segments of abdomen, rounded apically, not reticulate.

Color: Straw colored; vertex with four large marginal black spots back of which are two brown transverse bands, and a brown spot basally, near each eye. Pronotum with a pair of light brown spots on anterior margin and very faint trace of the five light longitudinal lines. Elytra subhyaline, unspotted. Abdomen with transverse row of fuscous dots on middle of each segment and sometimes with lateral black markings. Pygofers marked with black above.

External genitalia: Female, last ventral segment shorter than the preceding, composed of two membranes, the inner broadly concave medially, only its lateral rounded angles visible from under the outer basally broad, but apically narrowed membrane which has the posterior margin truncate or slightly produced, and the disc distinctly elevated; pygofers long and somewhat narrow, widest at the middle, very bristly apically and exceeded by the ovipositor. Male, last ventral segment as long as the preceding, valve small, broad but short, rounded posteriorly; plates broad basally, spiny margins concavely narrowed to long acute apices which exceed the very short, very bristly pygofers.

Distribution: Taken in Cherokee county.

Hosts: Unknown.

Genus ACONURA Leth.

The members of this genus are usually yellowish or grayish species, small and robust. The vertex is broad, obtusely angulate, transversely depressed and rounding to the front. The pronotum is short, usually shorter than vertex and with posterior portion transversely wrinkled. There are some macropterous forms, but usually the elytra are very short, and with weak venation. The ovipositor is very long, and the male genitalia are characteristic due to the abnormally large, chitinous styles and œdagus. Many males also possess a very large dorsal spine at the tip of the hind tibiæ which seems to vary for the different species.

Several undetermined species belonging to this genus have been taken in Kansas, but at present we have been able to make sure of only two species.

KEY TO SPECIES.

A. Robust forms; female segment with large median lobes, pygofers of male rounded. *robusta.*

AA. More slender forms; female segment with a very short or no median lobe in the broad excavation, pygofers of male acute, ending in long chitinous processes. *argenteolus.*

Aconura robusta (Bak.).

Athysanella robusta Bak., Psyche, viii, p. 187, 1898.
Aconura robusta Van D., Cat. Hemip. N. A., p. 653, 1917.

Form: Broad and robust. Length, 3 to 4 mm. Vertex short, half broader than long, transverse depression distinct, very obtusely angled. Pronotum short, nearly three times as wide as long, lateral margins long, humeral margins indistinct, appearing like part of the medially emarginate posterior margin, covering the base of the elytra and the scutellum, making the latter appear small. Elytra short, reaching just beyond third abdominal segment, rounded apically, venation weak.

Color: Grayish-yellow; vertex lighter than rest of body, with small to large brown spot near margin half way between eye and apex. Pronotum and elytra in specimens at hand unmarked. Abdomen usually with transverse row of dark spots on anterior portion of each segment and with faint longitudinal lines.

External genitalia: Female, last ventral segment deeply emarginate between the long acute lateral angles, with a distinct tooth in the emargination, which, in our forms, does not reach quite half way to the tips of the lateral angles; pygofers long and narrow, very sparsely bristled, greatly exceeded by the very long ovipositor. Male, last ventral segment posteriorly emarginate; valve small, obtusely angled; plates broad and short, diverging, broadly rounding apically; pygofers broadly rounding apically. Apex of hind tibiæ with a large, acutely pointed, dorsal spine, which reaches to about the middle of the first tarsal segment.

Distribution: Specimens are at hand from Ottawa county.

Hosts: Taken in pastures where buffalo grass and *Bouteloua* abound.

Aconura argenteolus (Uhl.).

Deltocephalus argenteolus Uhl., Bul. U. S. Geol. Surv., iii, p. 473, 1877.
Deltocephalus argenteolus Bak., Psyche, viii, p. 119, 1897.
Aconura argenteolus Horv., Ann. Mus. Natl. Hung., vi, p. 567, 1908.
Aconura argenteolus Van D., Cat. Hemip. N. A., p. 653, 1917.

Form: More slender than preceding species. Length, 2.75 to 4.5 mm. Vertex as long or slightly longer than wide, transversely depressed, more pointed apically than *robusta.* Pronotum shorter than vertex, anterior margin convex, lateral margins parallel and long, humeral margins fusing with slightly concave posterior margin. Elytra short, covering third abdominal segment, or long, reaching to pygofers, there being both macropterous and brachypterous forms in both sexes, venation weak.

Color: When alive this species is bluish-green and silvered. The dead specimens are yellowish, unmarked, or with the dark colors of the body showing through the pronotum and elytra, and each abdominal segment with a transverse row of dots on anterior portion.

External genitalia: Female, last ventral segment short, broadly and deeply emarginated medially and sometimes with a small tooth in the middle of the emargination; pygofers long and narrow but greatly exceeded by the very long ovipositor. Male, valve large, triangular, apex obtuse; plates large, diverging, outer margin sinuate, inner margin broadly rounding to meet outer margin in a subacute apex; pygofers drawn out into long black chitinous points which run down between the plates.

Distribution: Ottawa, Greeley and Lane counties.

Hosts: Taken in very large numbers with the preceding species in pastures where buffalo grass and *Bouteloua* are the chief grasses.

Genus DRIOTURA O. & B.

The members of this genus are very robust forms with short heads, vertex twice as wide as long, and parallel-margined. Face broad and short, twice as wide above as at parallel-margined clypeus. The pronotum is very short, a little longer than the vertex, transversely striated on posterior two-thirds. Elytra rarely long, reaching to ovipositor, usually short, coriaceous and coarsely rugose, barely covering second abdominal segment. Abdomen short in male, much inflated in female.

Two species and a variety of this genus have been taken in Kansas.

KEY TO SPECIES.

A.	Color black or brownish, usually unicolorous.	*gammaroidea.*
AA.	Color gray, vertex and pronotum marked with white.	*robusta.*

Driotura gammaroidea (Van D.).

Athysanus gammaroidea Van D., Bul. Buf. Soc. Nat. Sci., v, p. 209, 1894.
Driotura gammaroidea O. & B., Proc. Dav. Acad. Sci., vii, p. 89, pl. 4, fig. 3, 1898.
Driotura gammaroidea Osb., 20th Rept. N. Y. St. Ent., p. 529, 1905.
Anoterostemma gammaroidea Horv., Ann. Mus. Natl. Hung., vi, p. 568, 1908.
Driotura gammaroidea Osb., Me. Agr. Exp. Sta., Bul. 238, p. 132, 1915.
Driotura gammaroidea DeL., Tenn. St. Bd. Ent., Bul. 17, p. 64, 1916.
Driotura gammaroidea Van D., Cat. Hemip. N. A., p. 654, 1917.
Driotura gammaroidea Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 74, 1919.

Form: Short and robust. Length, 3 to 4 mm. Vertex twice as wide as long, front margin more convex than posterior, broadly rounding with front. Pronotum very short, over three times as wide as long, lateral margins distinct, in brachypterous forms humeral margins seemingly a part of the slightly emarginate posterior margin, more distinct in macropterous forms. Scutellum small. Elytra rarely long, reaching the ovipositor, usually short, covering second abdominal segment, coriaceous and coarsely rugose. Abdomen broad, inflated in female.

Color: Shining black; vertex sometimes with reddish-brown markings, legs and ovipositor reddish-brown.

External genitalia: Female, last ventral segment longer than preceding, three times as wide as long, narrowed posteriorly, margins about parallel; pygofers broad and short, much exceeded by the very long ovipositor. Male, last ventral segment longer than preceding, emarginate posteriorly; valve broad, rounded posteriorly; plates broad, diverging from the base, broadly rounded apically, equalling the short pygofers.

Distribution: Taken in Pottawatomie and Cherokee counties.

Hosts: Doctor Ball informs me that *Grindelia* is the host plant of this species.

Driotura gammaroidea var. *fulva* Ball.

Driotura gammaroidea var. fulva Ball, Can. Ent., xxxv, p. 231, 1903.
Driotura gammaroidea var. fulva DeL., Tenn. Bd. Ent., Bul. 17, p. 64, 1916.
Driotura gammaroidea var. fulva Van D., Cat. Hemip. N. A., p. 654, 1917.

Form: In size and shape as in *gammaroidea.*

Color: Nearly uniformly reddish-brown. Last segment of abdomen and ovipositor dark. Eyes and ocelli dark.

Genitalia: As in *gammaroidea.*

Distribution: Reported from Cherokee county only.

Hosts: That of preceding form.

Driotura robusta O. & B.

Driotura robusta O. & B., Proc. Dav. Acad. Sci., vii, p. 87, pl. 4, fig. 4, 1898.
Driotura robusta Metc., Jl. Elisha Mitchell Soc., xxxi, p. 28, 1915.
Driotura robusta DeL., Tenn. St. Bd. Ent., Bul. 17, p. 64, 1916.
Driotura robusta Van D., Cat. Hemip. N. A., p. 654, 1917.
Driotura robusta Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 73, 1919.

Form: Slightly smaller than *gammaroidea.* Length, 2.75 to 3.5 mm. Vertex slightly longer than in *gammaroidea,* otherwise structure much the same.

Color: Vertex varying much in markings, sometimes being light yellow with several small dark spots, often the anterior part with a few black marks and the disc with two large irregular spots. Face light above with dark arcs, then greater part of front black, tip of front light, and clypeus with large black spot. Pronotum anteriorly black, posterior two-thirds white, sometimes partly blackened. Elytra black with the nervures and ramose lines white. Abdomen maculately black and white.

External genitalia: Female, last ventral segment twice as long as preceding, lateral margins broadly rounded with slightly medially emarginate posterior margin; pygofers wedge-shaped, much exceeded by the very long ovipositor. Male, last ventral segment longer than preceding, emarginate posteriorly; valve broad but short, rounded posteriorly;

plates broad, divergent, outer margin concave, inner margin broadly rounding to meet outer margin in obtuse apex; pygofers slightly exceeding plates, covered with short bristles.

Distribution: Taken in Pottawatomie county only.

Hosts: Doctor Ball informs me that *Grindelia* is the host plant of this species.

Genus EUSCELIS Brul.

The members of this genus are generally robust with the head slightly wider than the pronotum. The vertex may be distinctly angulate. The pronotum is rather short. The elytra are long in the forms with a transverse vertex, but usually short in the others. The ovipositor is rather uniformly short, thus distinguishing it from some nearly related genera. The genus is distinctly lacking in positive characters.

Twelve species of this genus have been reported from Kansas and are keyed below.

KEY TO SPECIES.*

A. Vertex transverse, much wider than long, margins nearly or quite parallel, anterior margin obtusely rounding to front.
  B. Size very large, 7 mm. or over. *magnus.*
  BB. Size smaller, 6 mm. or less.
    C. Ground color white, not greenish, margin of vertex with black spots. *exitiosus.*
    CC. Ground color green, vertex with transverse bands.
      D. Vertex slightly longer on middle than against eye, transverse band on vertex narrow and straight. *striolus.*
      DD. Margins of vertex strictly parallel; transverse band on vertex broader, parallel with the margins. *parallelus.*
AA. Vertex not distinctly transverse, usually produced and angulate; anterior margin meeting front at an angle.
  B. Vertex distinctly wider than its middle length.
    C. Markings of vertex in form of transverse lines or absent.
      D. Species stout, elytra shorter than or only slightly exceeding abdomen, central anteapical cell rarely constricted.
        E. Straw-colored species. *extrusus.*
        EE. Black species.
          F. Vertex distinctly angular, nearly twice as long on middle as against eye; a yellow band at base of vertex and usually the nervures yellow. *uhleri.*
          FF. Vertex rounding, but little longer on middle than at eye. *anthracinus.*

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* Adapted from key by Osborn & Ball, Ohio Nat., ii, pp. 231-257, 1902.

AA. Vertex not distinctly transverse—*concluded.*

DD. Species more elongate, elytra longer than abdomen; anterior and middle legs with the black femora orange-tipped. *striatulus.*

CC. Margin of vertex with four black spots; pronotum striped with black and with four stripes on each elytron. *comma.*

BB. Vertex narrow, its basal width rarely equal to its middle length.

C. Face marked with a fuscous "Y"; ovipositor rarely extending beyond elytra. *curtisii.*

CC. Face without fuscous "Y"; ovipositor usually extending beyond elytra.

D. Face with a transverse white band below eyes, pronotum black and yellow. *bicolor.*

DD. Face unicolorous; pronotum with a row of submarginal spots. *obtutus.*

Euscelis magnus (O. & B.).

Athysanus magnus O. & B., Ia. Acad. Sci., iv, p. 225, pl. 26, fig. 2, 1897.
Athysanus magnus O. & B., Ohio Nat., ii, p. 273, 1902.
Euscelis magnus Van D., Cat. Hemip. N. A., p. 655, 1917.

Form: Very large and robust, by far the largest member of the genus. Length, 7 to 8.5 mm. Vertex practically parallel-margined, four times as wide as long, broadly rounding with front. Pronotum transverse, about three times as wide as long, nearly parallel-margined, lateral margins long and parallel, humeral margins broadly rounding with emarginate posterior margin, disc distinctly transversely wrinkled. Elytra broad, but distinctly exceeding the abdomen.

Color: Ashy-gray; vertex yellowish, sparsely irrorate, with brown along anterior and posterior margins, so that there seems to be a light transverse band between. Pronotum brownish, with a transverse yellow band just back of the middle. Elytra with light nervures marked with brown, the center of the cells irrorate with brown and the costal margin yellowish-white. Face yellow, irrorate with brown.

External genitalia: Female, last ventral segment scarcely longer than the preceding, lateral margins produced and broadly rounded, posterior margin deeply and broadly emarginate between the lateral lobes, slightly produced medially and with a distinct notch, so that there seem to be two small median lobes; pygofers robust and long, nearly equalling ovipositor, with a distinct longitudinal depression on the sides along apical third, bearing a few short spines distally. Male, valve triangular, narrow, about half the length of the last ventral segment, apex obtuse; plates nearly three times the last ventral segment, spiny margins rounding basally, then tapering to long acute tips which exceed the short bristly pygofers.

Distribution: Specimens are at hand from Douglas and Neosho counties. Reported also from Pottawatomie county.

Hosts: Osborn and Ball report taking this species from *Spartina cynosuroides* exclusively.

Euscelis exitiosus (Uhl.).

(Pl. 12, figs. 9-10.)

Cicadula exitiosa Uhl., Am. Ent., iii, p. 72, 1880.
Limotettix exitiosa Van D., Psyche, v, p. 306, 1892.
Eutettix exitiosus O. & B., Hemip. Colo., p. 100, 1895.
Athysanus exitiosus O. & B., Ohio Nat., ii, p. 234, pl. 16, fig. 2, 1902.
Athysanus exitiosus Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 86, fig. 21, 1912.
Athysanus exitiosa Will., Kans. Univ. Sci. Bul., viii, p. 226, 1913.
Phrynomorphus exitiosus Barb., Bul. Am. Mus. Nat. Hist., xxxiii, p. 534, 1914.
Athysanus exitiosus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 60, 1916.
Euscelis exitiosus Van D., Cat. Hemip. N. A., p. 655, 1917.
Euscelis exitiosus Fent., Ohio Jl. Sci., xviii, No. 6, p. 185, 1918.
Euscelis exitiosus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 70, 1919.

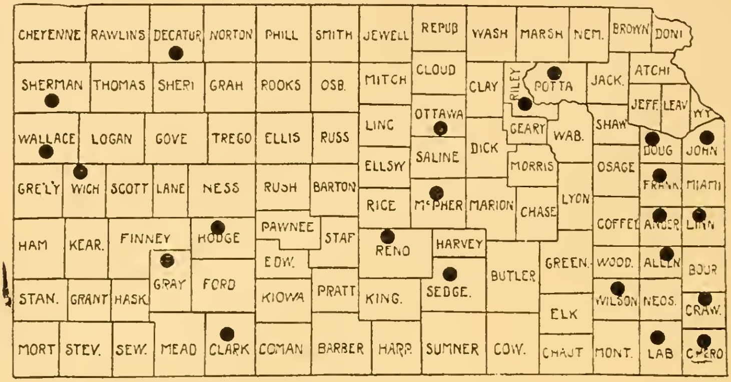
Form: Varying greatly in size. Length, 3.5 to 5.5 mm. Vertex one-third longer on middle than next the eye, over twice as broad as long, broadly rounding with front, obtusely angled at apex. Pronotum one-third longer than vertex, lateral margins short, posterior margin distinctly emarginate. Elytra greatly exceeding the abdomen, somewhat flaring apically, appendix large, extending entirely around the end of the wing.

Color: Varying greatly from quite light to dark forms. Vertex pale, with orange-yellow tinge, especially apically, with two black spots on margin, two black spots, usually fused into a line across the basal angle, and a brown crescent between the eyes, parallel to the anterior margin. Pronotum light brown with four black spots behind anterior margin, disc darker. Scutellum yellowish with black basal angles and a brown divided median line. Elytra milky, hyaline, nervures brown and distinct. Face light, marked with brown arcs.

External genitalia: Female, last ventral segment twice as long as preceding, posterior margin truncate or slightly emarginate; pygofers rather long and narrow, greatly exceeded by the ovipositor, sparsely spined. Male, valve small and triangular, apex obtuse; plates narrow and long, three times as long as the valve, divergent, submarginally spiny, exceeding the pygofers.

Internal male genitalia: Styles with long anterior process and stout process to connective, then narrowing rapidly to about the middle, the margins then about parallel up to the much bent terminal hook; connective slender, Y-shaped, the arms slightly longer than the stem which widens distally; œdagus with basal portion broad and triangular when viewed dorsally, terminal process heavy, widest at middle, ending in a blunt hook.

Distribution: One of the commonest Kansas species and found throughout the state as shown by the following map:



Hosts: Abundant on grasses and weeds and attracted to the lights in great numbers. A distinctly economic species.

Euscelis striolus (Fall.).

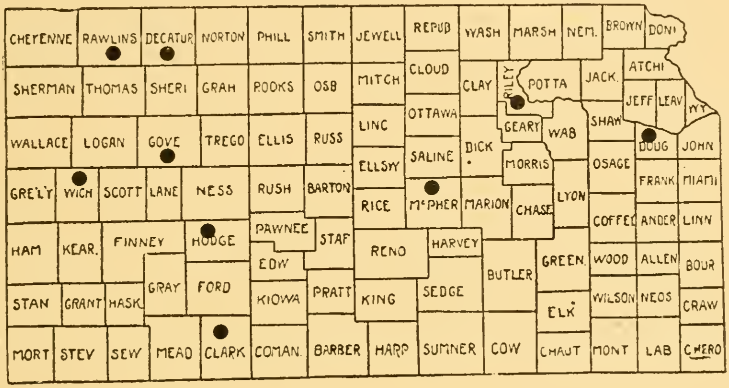
Cicada striola Fall., Acta Holm, xxvii, p. 31, 1806.
Jassus frenatus Germ., Mag. d. Ent., iv, p. 86, 1821.
Jassus striola Flor, Rhyn. Livl., ii, p. 315, 1861.
Limotettix striola Sahlb., Cicad., p. 226, 1871.
Athysanus striolus Fieb., Kat. Eur., Cicad., p. 12, 1872.
Athysanus striola O. & B., Proc. Dav. Acad. Sci., vii, p. 91, pl. 5, fig. 4, 1898.
Athysanus striolus O. & B., Ohio Nat., ii, p. 235, 1902.
Athysanus striolus Osb., 20th Rept. N. Y. St. Ent., p. 527, 1905.
Athysanus striolus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 132, 1915.
Euscelis striolus Van D., Univ. Calif. Publ., Div. Ent., Tech. Bul., i, p. 249, 1916.
Euscelis striolus Van D., Cat. Hemip. N. A., p. 656, 1917.

Form: Long and narrow, resembling an *Idiocerus*. Length, 3.5 to 5 mm. Head wider than pronotum; vertex slightly longer on middle than next the eye, over twice as wide as long, broadly rounding to front. Pronotum not quite twice the length of the vertex, twice as broad as long, lateral margins very short, posterior margin slightly emarginate. Elytra long, greatly exceeding abdomen, appendix large, nervures indistinct.

Color: Greenish; vertex with a rather narrow transverse black stripe just behind the reddish ocelli, not parallel with the margin, having broad green bands before and behind, the margin of vertex showing the topmost of the black facial arcs. Pronotum a little darker than the vertex or the scutellum, the latter with a black transverse impressed line. Elytra pale green, often clouded with fuscous apically. Face greenish, with sutures and arcs of front, black.

External genitalia: Female, last ventral segment twice as long laterally as preceding, lateral margins convex, posterior margin roundingly emarginate to about one-third the distance to the base; pygofers long and narrow, nearly or quite equalling the ovipositor, fairly spiny, especially apically. Male, valve broad, over half longer than last ventral segment, obtusely angled apically; plates together forming a triangle about as long as broad, three times as long as the valve, obtuse apices somewhat divergent. Margins heavily and surface sparsely spined.

Distribution: Occurs throughout the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GREELY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
PAWNEE
COFFEE
ANDER
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FINNEY
HODGE
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STAF
RENO
HARVEY
GREEN.
WOOD
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BOUR
BUTLER
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
ELK
WILSON
NEOS
CRAW
MORT
STEV
SEW
MEAD
CLARK
COMAN.
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Professor Osborn records sweeping this species from grasses in low, boggy places; Van Duzee from sweeping meadows and pasture lands.

Euscelis parallelus (Van D.).

Athysanus parallelus Van D., Can. Ent., xxiii, p. 169, 1891.
Limotettix parallelus Van D., Psyche, vi, p. 306, 1892.
Athysanus parallelus O. & B., Ohio Nat., ii, p. 235, 1902.
Euscelis parallelus Van D., Cat. Hemip. N. A., p. 653, 1917.

Form: Resembling *striolus* but larger and broader. Length, 5.25 to 6 mm. Head distinctly wider than pronotum; vertex not produced as in *striolus* but parallel-margined, two and one-half times as wide as long, broadly rounding to face. Pronotum about twice as long as vertex, lateral margins short, posterior margin very slightly emarginate. Elytra long and narrow, appendix large, apically flaring.

Color: Greenish; vertex pale yellow or greenish, with a heavy transverse band between the eyes, leaving only a narrow green band in front and a band about as wide as itself behind. Pronotum pale green, anterior margin narrowly black and sometimes the entire disc is darkened or even quite black, transverse striations distinct on disc. Scutellum pale yellow, unmarked, or with two black dots. Elytra usually pale green with lighter nervures, but often the elytra appear dark brown, due to the darkening of the cells. Face with the sutures, a line on the clypeus and the arcs on the front, black.

External genitalia: Female, last ventral segment nearly twice the length of the preceding, posterior margin slightly rounding, with a wide median incision reaching nearly to the middle; pygofers rather robust, equalling ovipositor, well covered with spines. Male, valve as broad and as long as last ventral segment, obtusely angled apically; plates very broad and stout, about twice as long as the valve, outer margins rounding to the very broad and slightly divergent apices, the whole ventral surface thickly covered with spines; pygofers completely hidden.

Distribution: Seemingly confined to the eastern portion of the state, as shown by its occurrence in Cherokee, Pottawatomie, Riley and Russell counties.

Hosts: Taken sweeping grasses and weeds.

Euscelis extrusus (Van D.).

Athysanus extrusus Van D., Can. Ent., xxv, p. 283, 1893.
Athysanus extrusus O. & B., Proc. Dav. Acad. Sci., vii, p. 92, pl. 6, fig. 1, 1898.
Athysanus extrusus O. & B., Ohio Nat., ii, p. 237, 1902.
Athysanus venosus Osb., 20th Rept. N. Y. St. Ent., p. 526, 1905.
Athysanus extrusus Osb., 20th Rept. N. Y. St. Ent., p. 527, 1905.
Athysanus extrusus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 127, 1915.
Athysanus extrusus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 61, 1916.
Euscelis extrusus Van D., Cat. Hemip. N. A., p. 656, 1917.

Form: Short and very robust. Length, 4.25 to 5.5. mm. Head as wide as pronotum; vertex twice as long on middle as next the eye, over one-third wider than long, obtusely angled apically. Pronotum short, equalled in length by the vertex, nearly three times as wide as long, lateral margins long, humeral margins broadly rounding with emarginate posterior margin, disc transversely wrinkled. Elytra short and broad, broadly rounding apically, just equalling abdomen in the macropterous female, and equalling or slightly exceeding it in the macropterous male, in brachypterous females leaving last abdominal segments and pygofers exposed.

Color: Yellowish, marked with fuscous and black. Vertex pale yellow with five dark triangular spots and with base of inner margin of eye fringed with black. Pronotum and scutellum yellowish marked with light brown. Elytra with nervures light, usually strongly bordered with fuscous. Face pale, the suture, two lines on the clypeus and the arcs on the front, black.

External genitalia: Female, last ventral segment twice the length of the preceding, narrowed posteriorly, lateral angles produced, between which the posterior margin is broadly and deeply excavated; pygofers broad, equalling ovipositor, sparsely spined. Male, valve triangular, as long as last ventral segment, obtusely angled apically; plates broad, three times as long as valve, lateral margins parallel, inner margins roundingly divergent to meet lateral margins in an obtuse apex, sparsely spined along margin and surface, more spiny apically; pygofers very characteristic, compressed beneath the plates, terminating in long style-like processes which extend beyond the plates by the length of the latter.

Distribution: Hitherto taken in Douglas county only.

Hosts: A grass species.

Euscelis uhleri (Ball).

Athysanus uhleri Ball, Can. Ent., xliii, p. 200, 1911.
Athysanus plutonius Prov., Pet. Faune Ent. Can., iii, p. 282, 1889.
Athysanus plutonius O. & B., Ohio Nat., ii, 240, pl. 16, fig. 3, 1902.
Athysanus plutonius Osb., 20th Rept. N. Y. St. Ent., p. 528, 1905.
Athysanus plutonius Osb., Me. Agr. Exp. Sta., Bul. 238, p. 126, 1915.
Euscelis uhleri Van D., Cat. Hemip. N. A., p. 657, 1917.

Form: Robust, widening distally. Length, 4 to 4.5 mm. Vertex nearly twice as long on middle as next the eye, twice as long as broad, obtusely angled apically, margins straight. Pronotum half longer than vertex, lateral margins short, posterior margin slightly emarginate, disc transversely wrinkled. Elytra moderately long, equalling or slightly exceeding abdomen, broad, nearly truncate posteriorly.

Color: Black; vertex with broad line, a spot against either eye, several apical and preapical spots, yellow. Pronotum with a few yellow spots. Scutellum with yellow spots along margin and at apex, two curved basal lines on either side of the middle. Elytra with nervures broadly yellow. All the above yellow markings may be lacking, resulting in a shining black form. On the other hand, the yellow markings may be much stronger and the elytra may be smoky or fuscous with the nervures broadly margined with fuscous. Face black with yellow arcs and sometimes with yellow spots. Front and middle legs yellow from tip of femora on.

External genitalia: Female, last ventral segment a little longer than the preceding, lateral angles produced, subacute, between them the posterior margin is widely emarginate, the middle portion slightly roundingly produced; pygofers broad and short, exceeded by the ovipositor, sparsely spined on distal half. Male, valve about half as long as last ventral segment, rounding posteriorly; plates about two and one-half times as long as valve, tapering to subacute apices which exceed the pygofers.

Distribution: Reported from Riley county.

Hosts: Taken from grasses.

Euscelis anthracinus (Van D.).

Athysanus anthracinus Van D., Can. Ent., xxvi, p. 136, 1894.
Athysanus anthracinus O. & B., Ohio Nat., ii, p. 241, 1902.
Athysanus anthracinus Osb., 20th Rept. N. Y. St. Ent., p. 528, 1905.
Athysanus anthracinus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 126, 1915.
Athysanus anthracinus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 61, 1916.
Euscelis anthracinus Van D., Cat. Hemip. N. A., p. 658, 1917.
Euscelis anthracinus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 71, 1919.
(*Schleroracus anthracinus* Uhl. MS.) in litt.
(*Conogonus gagates* Ashm. MS.) Osb., Proc. Ia. Acad. Sci., I, pt. 2, p. 126, 1892.

Form: Much like preceding species. Length, 3.5 to 4.5 mm. Vertex slightly longer on middle than against eye, two to two and one-half times as wide as long, and obtusely conical and broadly rounding with front, blunter apically than *uhleri.* Pronotum about twice as long as vertex, lateral margins short, posterior margin distinctly concave, disc transversely wrinkled. Elytra broad, exceeding abdomen, broadly rounding and slightly flaring apically.

Color: Shining black; vertex with ocelli, two basal spots and sometimes an apical spot, yellow. Face with a few yellow arcs on front. Front and middle legs yellow from the apex of the femora.

External genitalia: Female, last ventral segment slightly longer than preceding, posterior margin broadly and shallowly emarginate, slightly produced medially, lateral angles obtuse; pygofers broad, nearly or quite equalling ovipositor, sparsely spined on distal half. Male, valve broad, triangular, very obtuse apically, nearly or quite as long as last ventral segment; plates over twice the length of the valve, roundingly triangular to blunt apices, margins and tips spiny, equalling the apically rounding pygofers.

Distribution: Seemingly found only in the eastern portion of the state as shown by its occurrence in Douglas, Pottawatomie, Linn and Chautauqua counties.

Hosts: A grass species.

Euscelis striatulus (Fall.).

Cicada strialuta Fall., Hemip. Suec., Cicad., p. 45, 1826.
Jassus striatulus Flor., Rhyn. Livl., ii, p. 361, 1861.
Limotettix striatula Sahlb., Cicad., 253, 1871.
Jassus plutonius Uhl., Bul. U. S. Geol. Geog. Surv., iii, p. 470, 1877.
Athysanus striatulus Mel., Cicad. Mitt. Eur., p. 264, 1896.
Thamnotettix striatulus Edw., Hemip. Homop. Brit. Isds., p. 172, pl. 19, fig. 9, 1896
Athysanus striatulus O. & B., Proc. Dav. Acad. Sci., vii, p. 91, pl. 5, fig. 3, 1898.
Athysanus vaccinii O. & B., Ohio Nat., ii, p. 242, 1902.
Athysanus vaccinii Osb., 20th Rept. N. Y. St. Ent.. p. 528, 1905.
Athysanus vaccinii Osb., Me. Agr. Exp. Sta., Bul. 238, p. 130, 1915.
Euscelis striatulus Van D., Cat. Hemip. N. A., p. 658, 1917.

Form: Rather long and slender, especially the males. Length, 3.5 to 4.5 mm. Vertex about one-fourth longer on middle than near the eyes, twice as wide as long, disc sloping and broadly rounded with front, apex obtusely angled. Pronotum nearly or fully twice the length of the vertex, lateral margins short, posterior margin slightly emarginate. Elytra long, much exceeding the abdomen, somewhat flaring.

Color: Vertex, pronotum and scutellum dirty or greenish-yellow. Vertex with two curved marginal lines, a median transverse band and posteriorly a band or a row of two or four spots, brown. Pronotum irregularly marked with brown spots, often a row of them near and parallel to the anterior margin. Scutellum pale or marked with brown spots, basal angles often marked with orange-brown. Elytra greenish-brown, nervures light and narrowly fuscous-margined. Face light, with sutures and arcs black. Basal two-thirds of femora black, apices and tibiæ yellow.

External genitalia: Female, last ventral segment slightly longer than the preceding, posterior margin emarginate between the produced lateral angles and slightly rounding in the middle; pygofers broad, slightly exceeded by the ovipositor, spiny on distal half. Male, valve broad, triangular, obtusely angled apically, three-fourths as long as last ventral segment; plates triangular, over twice as long as the valve, spiny margins convexly narrowing to subacute apices which exceed the pygofers.

Distribution: Taken in Pottawatomie county only.

Hosts: A prairie grass species.

This is the form that Osborn & Ball identify as *Euscelis vaccinii* (Van D.). In his catalog Mr. Van Duzee, while still giving *Euscelis striatulus* (Fall.) and *Euscelis vaccinii* (Van D.) separate numbers, remarks that they are probably not distinct. If this is true then of course Fallen's name stands. Dr. Ball, however, thinks they are separate species and that the form described above is *Euscelis vaccinii* (Van D.). Until some one goes into a careful study of the two above species, *Euscelis instabilis* (Van D.) and probably others, it might be well to follow Van Duzee's synonomy.

Euscelis comma (Van D.).

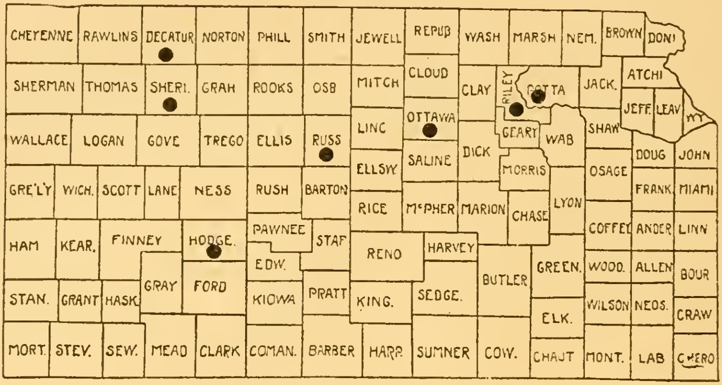
Athysanus comma Van D., Can. Ent., xxiv, p. 114, 1892.
Athysanus comma O. & B., Proc. Ia. Acad. Sci., iv, p. 223, 1897.
Athysanus comma O. & B., Ohio Nat., ii, p. 246, pl. 17, fig. 1, 1902.
Euscelis comma Van D., Cat. Hemip. N. A., p. 660, 1917.

Form: Broad and stout. Length, 4 to 5 mm. Vertex three-fourths longer on middle than next the eye, almost twice as wide as long, disc flat, obtusely rounding with front, obtusely angled apically. Pronotum one-third longer than vertex, two and one-half times as wide as long, lateral margins long, humeral margins fused with slightly emarginate posterior margin. Elytra long, exceeding the abdomen, parallel-margined or short and somewhat flaring, reaching the last abdominal segment, venation indistinct.

Color: Creamy, marked with black and brown. Vertex with four large black marginal spots which extend on to the front, and two large basal ones. Pronotum with four black longitudinal lines, the inner pair extending across the scutellum. Elytra pale with black or dark brown lines on claval suture, around apex, and along inner branch of first sector. Fulvous brown bands are found on the clavus, dividing anteriorly to meet the lines on the pronotum and scutellum, and one parallel with the outer and posterior margin. In the brachypterous forms a large black comma is found on either side of the pygofer. Face and below pale with a black spot below the antennæ, a pair below the lateral margins of the pronotum and a stripe on the lateral margin of the connexivum.

External genitalia: Female, last ventral segment half longer than the preceding, lateral angles obtuse and produced, posterior margin roundingly emarginate with a black-margined median slit; pygofers broad and stout, slightly exceeded by the ovipositor, sparsely spined. Male, valve large, triangular, apex very obtuse or truncated, sides notched; plates twice the length of the valve, margins rounding basally to the middle, then nearly parallel to the truncate apices which nearly or quite equal the robust and short pygofers.

Distribution: Probably occurs throughout the state as shown by the following map: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DECATUR
NORTON
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JEWELL
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THOMAS
SHERI.
GRAH
ROOKS
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POTTA
JACK.
ATCHI
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TREGO
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JEFF.
LEAV
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SALINE
DICK
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GRE'LY
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NESS
RUSH
BARTON
ELLSW
MORRIS
OSAGE
FRANK.
MIAMI
RICE
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MARION
CHASE
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STAF
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HARVEY
COFFEE
ANDER
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EDW.
GRAY
FORD
BUTLER
GREEN.
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KIOWA
PRATT
KING.
SEDGE.
WILSON
NEOS.
CRAW
ELK.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Osborn and Ball give *Elymus canadensis* as the host of this species.

Euscelis curtisii (Fh.).

Amblycephalus curtisii Fh., Homop. N. Y. St. Cab., p. 61, 1851.
Tettigonia curtisii Walk., List Homop., iv, p. 1159, 1852.
Jassus nervatus Prov., Nat. Can., iv, p. 378, 1872.
Deltocephalus curtisii Prov., Pet. Faune Ent. Can., iii, p. 278, 1889.
Athysanus curtisii Van D., Psyche, v, p. 290, 1890.
Athysanus curtisii Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Athysanus curtisii O. & B., Proc. Ia. Acad. Sci., iv, p. 221, 1897.
Athysanus curtisii O. & B., Proc. Dav. Acad Sci., vii, p. 91, pl. 5, fig. 1, 1898.
Athysanus curtisii O. & B., Ohio Nat., ii, p. 251, 1902.
Athysanus curtisii Osb., 20th Rept. N. Y. St. Ent., p. 529, 1905.
Athysanus curtisii Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 91, fig. 22, 1912.
Athysanus curtisii Osb., Me. Agr. Exp. Sta., Bul. 238, p. 125, 1915.
Athysanus curtisii DeL., Tenn. St. Bd. Ent., Bul. 17, p. 62, 1916.
Euscelis curtisii Van D., Cat. Hemip. N. A., p. 660, 1917.
Euscelis curtisii Fent., Ohio Jl. Sci., xviii, No. 6, p. 185, 1918.

Form: Short and stout. Length, 3 to 3.5 mm. Vertex one-half longer on middle than against eye, about as wide as long, broadly rounding with front, right-angled apically. Pronotum slightly longer than vertex, lateral margins very short, humeral margins distinct, long, posterior margin very slightly emarginate. Elytra broad and short, usually equalling or exceeding the abdomen, venation simple.

Color: Vertex yellow with two large black spots before the middle and sometimes black marks apically. Pronotum with broad, shining, black anterior band, a wide median yellow band and a narrow, black posterior one. Scutellum yellow, with two brown spots on the disc. Elytra fuscous or nearly black, margins and all nervures but those of the apical cells broadly greenish-yellow. Face pale with dark spot on apex of front, dark stripes on margins of front and on clypeus, forming a black Y.

External genitalia: Female, last ventral segment half longer than preceding, composed of two membranes, the rounding lateral angles only of the inner one showing from under the posteriorly narrowed outer membrane, whose posterior margin is slightly emarginate with sometimes a very small median lobe; pygofers robust, nearly or fully equalling the ovipositor, sparsely spiny. Male, valve broad, as long as last ventral segment, posterior margin rounding; plates together forming a triangle about as broad as long, spiny margins convexly narrowing to acute apices which exceed the spiny pygofers.

Distribution: Taken in Cherokee, Douglas and Riley counties.

Hosts: A very common blue-grass species.

Euscelis bicolor (Van D.).

(Pl. 13, figs. 1-2.)

Athysanus bicolor Van D., Can. Ent., xxiv, p. 114, 1892.
Deltocephalus virgulatus Uhl., Proc. Zoöl. Soc. Lond. for 1895, p. 78.
Athysanus bicolor O. & B., Proc. Ia. Acad. Sci., iv, p. 222, 1897.
Athysanus bicolor O. & B., Proc. Dav. Acad. Sci., vii, p. 91, pl. 5, fig. 2, 1897.
Athysanus bicolor O. & B., Ohio Nat., ii, p. 251, 1902.
Athysanus bicolor Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 92, fig. 23, 1912.
Athysanus bicolor DeL., Tenn. St. Bd. Ent., Bul. 17, p. 62, 1916.
Euscelis bicolor Van D., Cat. Hemip. N. A., p. 661, 1917.
Euscelis bicolor Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 71, 1919.

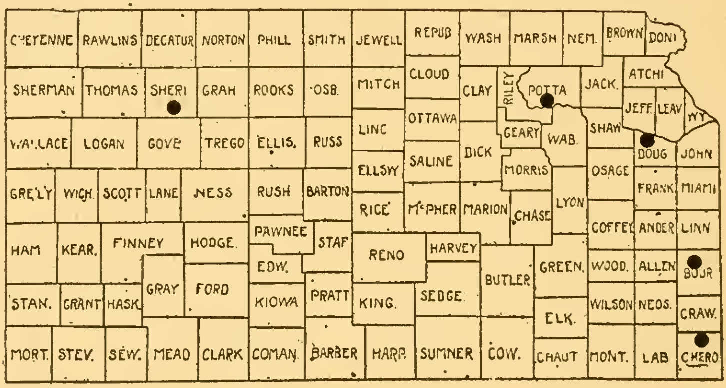
Form: Very much like *curtisii.* Length, 3 to 3.5 mm. Vertex narrower than in *curtisii,* about as wide as long, one-half longer on middle than against eye, conical apically. Pronotum as long as the vertex, lateral margins very short, humeral margins long, posterior margin barely emarginate. Elytra rather short and broad, rounding apically, venation simple.

Color: Vertex yellow, with a pair of large black spots on anterior half in the female which may be confluent and cover the entire anterior half of the vertex as is the case in the male. Pronotum with anterior margin black, the remainder bright yellow. Elytra greenish-yellow with humeral, sutural and apical margins and claval suture fuscous or black, and sometimes with subhyaline and fuscous arcs extending obliquely backward from the costal margins. Face black or fuscous above, pale below, a fuscous lower band sometimes present in the male.

External genitalia: Female, last ventral segment about as long as the preceding, posterior margin angularly emarginate; pygofers moderately robust, widest at the middle, much exceeded by the long ovipositor, very sparsely spined. Male, valve very small, forming an equilateral triangle one-third as wide as the last ventral segment; plates small, short, little longer than the valve, together nearly semicircular, their margins spiny; pygofers exceeding the plates, light apically.

Internal male genitalia: Styles with long, parallel-margined process to connective, a large quadrangular lateral process at about the middle, a distinct notch on the inner margin at the base of the finger-like, granular, terminal process; connective, with sides close together for a short distance at the base, then spreading and running parallel to tip where they fuse and join the long œdagus which narrows to the acute, bifurcated apex, the points close together at the tips, a circular excision between them basally.

Distribution: Common in eastern portion of the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
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SMITH
JEWELL
REPUB
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WALLACE
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TREGO
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JOHN
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MORRIS
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GRE'LY
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BARTON
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McPHER
MARION
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PAWNEE
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SEDGE.
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WILSON
NEOS.
CRAW.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Feeds on several different grasses, especially those in low places.

Euscelis obtutus (Van D.).

Athysanus obtutus Van D., Can. Ent., xxiv, p. 115, 1892.
Athysanus obtutus O. & B., Proc. Ia. Acad. Sci., iv, p. 222, pl. 21, fig. 2, 1897.
Athysanus obtutus O. & B., Ohio Nat., ii, p. 252, 1902.
Athysanus obtutus Osb., U. S. Dept. Agr., Div. Ent., Bul. 108, p. 93, fig. 24, 1912.
Phrynomorphus obtutus Barb., Bul. Am. Mus. Nat. Hist., xxxiii, p. 534, 1914.
Athysanus obtutus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 63, 1916.
Euscelis obtutus Van D., Cat. Hemip. N. A., p. 661, 1917.
Euscelis obtutus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 72, 1919.

Form: Much like *bicolor.* Length, 3 to 3.5 mm. Vertex longer and narrower than in *bicolor*, slightly longer than wide, conical apically. Pro notum about as long as vertex, lateral margins very short, humeral margins long, posterior margin very slightly emarginate, disc transversely wrinkled. Elytra rather narrow, apex rounding, not reaching tip of ovipositor and much exceeding abdomen in male.

Color: Vertex brownish, with a pair of large round black spots on disc and usually a smaller pair behind them. Pronotum brownish, with a row of small dark spots near and parallel to anterior margin. Scutellum with four dark spots along base. Elytra fuscous, subhyaline, nervures pale except for the apical ones, which are strongly fuscous. Face brownish, with darker stripes and sometimes the apex of the clypeus fuscous.

External genitalia: Female, last ventral segment about the length of the preceding, posterior margin slightly emarginate; pygofers rather narrow, much exceeded by the long ovipositor, very sparsely spined. Male, valve very small, equilaterally triangular, one-third as wide as last ventral segment; plates but little exceeding the valve, bristly margins broadly rounding, exceeded by the pygofers.

Distribution: Taken in Cherokee, Douglas and Riley counties.

Hosts: Osborn and Ball give *Andropogon scoparius* as a host plant. It likely occurs on other grasses also.

Genus EUTETTIX Van D.

Doctor Ball characterizes this genus as follows:

"Rather stout, head of about the same width as pronotum. Vertex rather short, slightly sloping, distinctly transversely depressed, the apex often slightly concavely upturned. Elytra moderately long, usually slightly flaring, venation simple, only one cross nervure between the sectors. Elytra without supernumerary veinlets or ramose lines, or with these reduced or aggregated into oblique bands."

Mr. Van Duzee adds *E. cinctus* O. & B. to this group. It usually has but one cross nervure between the sectors, but has supernumerary veinlets to the costa.

The six species keyed below have been taken in Kansas.

KEY TO SPECIES.*

A. Elytra without distinct transverse bands.
  B. Large species, over 5 mm. long, elytra black, with large yellow commissural spot. *pictus.*
  BB. Small species, less than 4 mm. long, pale yellowish-green. *tenellus.*
AA. Elytra with oblique bands, obscure in *albidus.*
  B. Elytra with oblique bands distinct.
    C. Anterior half of elytra white or but faintly reticulated. *seminudus.*
    CC. Anterior half of elytra distinctly marked.
      D. Insect reddish, no oblique spot on base of clavus. *strobi.*
      DD. Insect not reddish, a black oblique spot on base of clavus. *cinctus.*
  BB. Elytra without distinct oblique band, with whole elytra sparsely reticulate. *albidus.*

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* Adapted from key by Doctor Ball, Proc. Dav. Acad. Sci., xii, p. 31, 1907.

Eutettix pictus Van D.

Eutettix pictus Van D., Trans. Am. Ent. Soc., xix, p. 301, 1892.
Eutettix magnus Osb., Ent. News, xi, p. 395, 1900.
Eutettix subænea var *picta* Ball, Proc. Dav. Acad. Sci., xii, p. 34, pl. 1, fig. 1, 1907.
Eutettix subænea var *picta* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 65, 1917.
Eutettix pictus Van D., Cat. Hemip. N. A., p. 663, 1917.
Eutettix pictus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 75, 1919.

Form: Large and robust. Length, 5 to 7 mm. Vertex little longer on middle than next the eyes, over twice as wide as long, disc sloping to a preapical transverse depression, then elevated, sloping portion longitudinally striated, raised portion transversely striated. Pronotum over twice as broad as long, lateral margins shorter than the humeral, posterior margin slightly emarginate, disc transversely wrinkled. Scutellum broad, elytra moderately long, exceeding the abdomen, venation simple, only one cross nervure between the sectors.

Color: Vertex, pronotum and scutellum lemon-yellow; anterior half of pronotum dark brown or black, a band of like color across the pronotum just in front of the yellow posterior margin. Elytra dark brown or black, a common oval spot on the suture before the apex of clavus and anterior two-thirds of costal margin, pale yellow, these varying greatly in size, sometimes absent. Sometimes a large hyaline spot before the apex. Face in males dark, in females black above and below but light in the middle.

External genitalia: Female, last ventral segment half longer than preceding, posterior margin shallowly emarginate on either side of a small median lobe; pygofers broad, exceeded by the ovipositor, slightly spined. Male, valve broad, triangular, margins concave just before the subacute apex; plates large, convex, over three times as long as the valve, spiny margins rounding to blunt apices which equal the pygofers.

Distribution: Taken in Cherokee county only.

Hosts: De Long reports this species from oak shrubs.

Eutettix tenellus (Bak.).

Thamnotettix tenellus G. & B., Hemip. Colo., p. 100, 1895 (MS. name).
Thamnotettix tenellus Bak., Psyche, vii, Suppl., p. 24, 1896.
Eutettix tenella Ball, U. S. Dept. Agr., Bur. Ent., Bul. 66, pt. 4, p. 35, pl. 1, fig. 1, 1904.
Eutettix tenella Ball, Proc. Dav. Acad. Sci., xii, p. 41, pl. 1, fig. 11, pl. 4, figs. 4, 5, 1907.
Eutettix tenella Essig, Inj. Benef. Ins. Calif., edn. 2, p. 64, 1915.
Eutettix tenella Smith & Boncq., Phytopathology, v, p. 335, 1915.
Eutettix tenella Boncq. & Hart., Phytopathology, p. 348, 1916.
Eutettix tenellus Van D., Cat. Hemip. N. A., p. 664, 1917.
Eutettix tenella Ball, Utah Agr. Col. Exp. Sta., Bul. 155, 1917.
Eutettix tenella Ser. & Thom., Jl. Ec. Ent., xi, p. 308, 1918.
Eutettix tenella Sev. & Thom., Jl. Ec. Ent., xi, p. 308, 1918.
Eutettix tenella Stahl & Carsn., Jl. Agr. Research, xiv, p. 393, 1918.
Eutettix tenella Sev., Jl. Ec. Ent., xii, pp. 303, 312, 1919.
Eutettix tenella Sev., Facts About Sugar, 8, Nos. 7-13, 1919.

Form: Length, 3 to 3.5 mm. Vertex one-fourth longer on middle than next the eye, about twice as wide as long, transverse depression lacking or obscure, broadly rounding with front, apex rounding. Pronotum twice as long as vertex, lateral margins very short. Elytra long, greatly exceeding the abdomen.

Color: Pale yellowish-green. Vertex yellowish or pale orange-yellow. Pronotum pale green, the disc darker than the margins. Scutellum greenish-yellow. Elytra greenish-yellow, subhyaline, the black abdomen showing through. Face yellowish.

External genitalia: Female, last ventral segment about as long as the preceding, lateral angles broadly rounded and slightly produced, median portion of posterior margin slightly produced, with a semicircular excision reaching about half way to the base; pygofers long, slightly exceeded by ovipositor, sparsely spined on apical third. Male, valve large, semicircular or truncated apically; plates together wider than long, submarginally spined, margins practically parallel to the broad, roundingly truncate apices which are slightly exceeded by the pygofers.

Distribution: The only specimens at hand are from Clark county. This species probably occurs in other southwestern counties.

Hosts: This is the well-known leaf hopper of the sugar beet. Wherever the latter are grown this species is of great economic importance as shown by Ball's work.

Eutettix seminudus (Say).

(Pl. 13, figs. 5-6.)

Jassus seminudus Say, Jl. Acad. Nat. Sci. Phila., vi, p. 307, 1831; Compl. Writ., ii, p. 383.
Bythoscopus seminudus Fh., Homop. N. Y. St. Cab., p. 58, 1851.
Thamnotettix seminudus Uhl., Stand. Nat. Hist., ii, p. 246, 1884.
Athysanus seminudus Van D., Psyche, v, p. 389, 1890.
Eutettix seminudus Van D., Psyche, vi, p. 307, 1892.
Eutettix seminudus Osb., 20th Rept. N. Y. St. Ent., p. 529, 1905.
Eutettix seminuda Ball, Proc. Dav. Acad. Sci., xii, p. 42, pl. 2, fig. 1, 1907.
Eutettix seminuda DeL., Tenn. St. Bd. Ent., Bul. 17, p. 66, 1916.
Eutettix seminudus Van D., Cat. Hemip. N. A., p. 664, 1917.
Eutettix seminudus Weiss, Ent. News, xxix, p. 310, 1918.
Eutettix seminudus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 76, 1919.

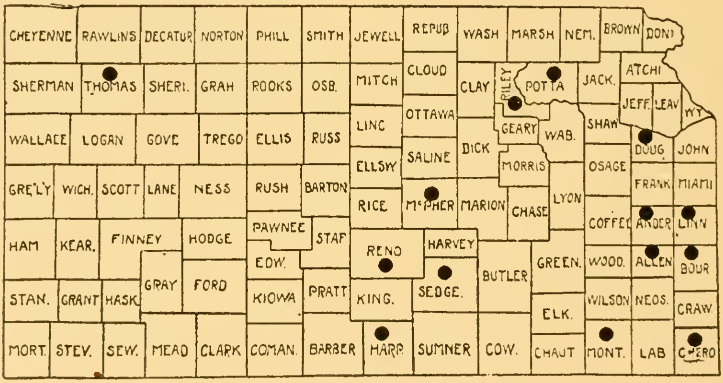
Form: Length, 4 to 5 mm. Vertex one-fourth longer on middle than next the eye, two and one-half times as wide as long, a distinct transverse depression just behind the broadly rounding apex. Pronotum scarcely twice as wide as long, lateral margins very short, humeral margins long. Elytra moderately long, venation indistinct.

Color: Vertex and pronotum creamy white, latter sometimes faintly irrorate with brown. Scutellum white, with basal angles and broad median stripe brown. Elytra milky white, a broad brown saddle across the posterior half of the clavus, a few brown reticulations on the base of the clavus and between the saddle and the brownish apices. Face creamy white.

External genitalia: Female, last ventral segment twice as long as the preceding, notched on either side of a median tooth which itself is slightly notched; pygofers moderately broad, exceeded by ovipositor, sparsely covered with white spines which arise from black dots. Male, valve large, rounded posteriorly; plates together forming a triangle about as long as wide, over twice as long as the valve, spined margins convexly narrowing till near the subacute apices which equal the broad pygofers.

Internal male genitalia: Styles large, triangular in outline, anterior process large, with a deep incision on the outer margin apically, leaving a long, somewhat curved, bluntly pointed, terminal process; connective short, Y-shaped, the stem slightly longer than the branches; œdagus heavy basally and with a large dorsal process to the membrane of the anal tube, divided terminally into a moderately stout median process and two slender lateral processes.

Distribution: Common throughout the state, especially in the eastern part, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG
JOHN
DICK
SALINE
ELLSW
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
GREEN.
WOOD.
ALLEN
BOUR
EDW.
BUTLER
STAN.
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
WILSON
NEOS.
CRAW
ELK.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: The plant or plants on which the nymphs feed are not yet definitely known, but the adults are taken on a large number of plants such as grape, garden vegetables and many others.

Eutettix strobi (Fh.).

(Pl. 13, figs. 3-4.)

Bythoscopus strobi Fh., Homop. N. Y. St. Cab., p. 58, 1851.
Phlepsius strobi Van D., Psyche, v, p. 390, 1890.
Eutettix strobi Bak., Psyche, vii, Suppl. i, p. 24, 1896.
Eutettix strobi Osb., 20th Rept. N. Y. St. Ent., p. 531, 1905.
Eutettix strobi Ball, Proc. Dav. Acad. Sci., xii, p. 44, pl. 2, fig. 2, pl. 4, fig. 3, 1907
Eutettix strobi Ball, U. S. Dept. Agr., Bur. Ent., Bul. 66, pl. 4, p. 49, 1909.
Eutettix strobi Osb., Me. Agr. Exp. Sta., Bul. 238, p. 138, 1915.
Eutettix strobi DeL., Tenn. St. Bd. Ent., Bul. 17, p. 67, 1916.
Eutettix strobi Van D., Cat. Hemip. N. A., p. 665, 1917.
Eutettix strobi Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 76, 1919.

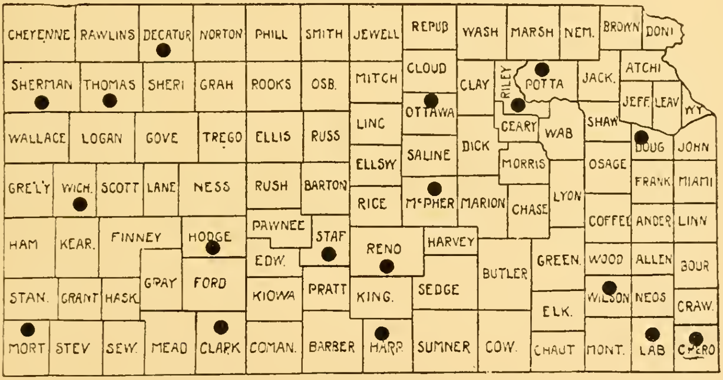
Form: Much like *seminudus.* Length, 4.5 to 5.25 mm. Vertex one-fourth longer on middle than next the eye, two and one-half times as wide as long, with a faint transverse depression, and broadly rounded apically. Pronotum over twice as wide as long, lateral margins rather short. Elytra moderately long.

Color: Vertex, pronotum and scutellum varying from yellowish irrorate with brown, to reddish-brown. Elytra usually milky-white with bands of brown at base, and across apical half of clavus. Frequently these bands are so run together as to give the entire elytra a brownish appearance. Face the color of the vertex.

External genitalia: Female, last ventral segment long, lateral angle broadly rounding, posterior margin notched on either side of a small median notched lobe which gives the appearance of two median teeth; pygofers broad, nearly or quite equalling the ovipositor, sparsely spined. Male, valve broad, rounded posteriorly; plates broad basally then rapidly narrowed, ending in elongate filamentous tips which exceed the pygofers.

Internal male genitalia: Styles large, triangular, broad basally, terminal process slightly convex on mesal margin, posteriorly straight on outer margin; connective very stout, Y-shaped, arms about equalling the basally broadened stem; œdagus with a wide, dorsal process to anal tube membrane, terminal portion composed of a broad median strap-like and terminally bifid process and a pair of lateral narrower and acutely pointed processes.

Distribution: Seemingly our most widely distributed member of the genus, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
CEARY
WAB
SHAW
JEFF
LEAV
WY
DICK
SALINE
ELLSW
DOUG
JOHN
OSAGE
MORRIS
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
EDW.
RENO
HARVEY
COFFEE
ANDER
LINN
GREEN.
WOOD
ALLEN
BOUR
STAN.
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
BUTLER
ELK.
WILSON
NEOS
CRAW.
MORT
STEV
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: This is the species producing the purple spots on *Chenopodium.* De Long reports taking specimens from wild rose.

Eutettix cinctus O. & B.

(Pl. 13, figs. 7-8.)

Eutettix cinctus O. & B., Proc. Dav. Acad. Sci., vii, p. 97, 1898.
Eutettix jucunda Van D., Psyche, vi, p. 307, 1892.
Eutettix cincta Osb., 20th Rept. N. Y. St. Ent., p. 530, 1905.
Eutettix (*Mesamia*) *cincta* Ball, Proc. Dav. Acad. Sci., xii, p. 64, pl. 4, fig. 1, 1907.
Eutettix cincta DeL., Tenn. St. Bd. Ent., Bul. 17, p. 67, 1916.
Eutettix cinctus Van D., Cat. Hemip. N. A., p. 665, 1917.
Eutettix cincta Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 77, 1919.

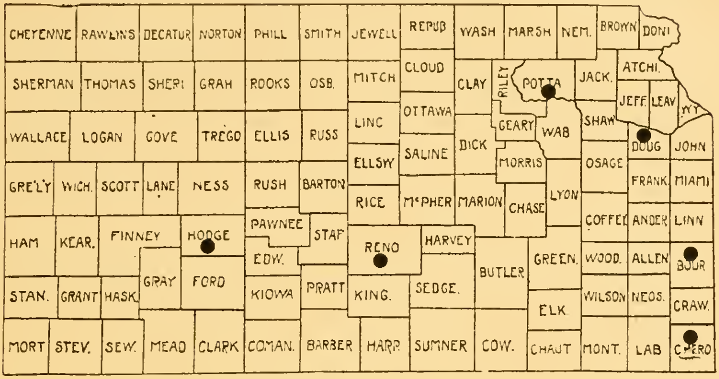
Form: Rather large and robust. Length, 5.25 to 6.25 mm. Vertex one-third longer on middle than next the eye, two and one-half times or over as wide as long, a distinct transverse depression just back of the broadly rounding apex, margin subacute. Pronotum over twice as wide as long, lateral margins short, humeral margins long, posterior margin distinctly concave, disc transversely wrinkled. Elytra moderately long and broad.

Color: Vertex greenish-yellow, apex with reddish tinge. Pronotum yellowish or greenish, irregularly marked with brown. Scutellum dirty-yellow, a small pair of black spots on disc and a larger pair on each lateral margin. Elytra milky, nervures reddish-brown, a large oblique black spot on the base of clavus of each elytron, a broad, brownish band on posterior half of the clavus and sloping back to the costa, costal veinlets broadly black. Face color of vertex above, dark below.

External genitalia: Female, last ventral segment one-half longer than the preceding, lateral margins strongly narrowed posteriorly, posterior margin sinuate on either side of the slightly produced median half; pygofers broad and short, slightly exceeded by the ovipositor, quite spiny on distal half. Male, valve broad but short, triangular, apex very obtuse; plates large, spiny margins concavely narrowing to upturned apices which exceed the pygofers.

Internal male genitalia: Styles large, with an unusually long process to the connective, very strongly hooked distally; connective very long, Y-shaped but with the branches close together, the stem and the branches about equal length; œdagus with an interior process to membrane of anal tube directed cephalad, and two sword-shaped caudal processes, one directly above the other, the dorsal one slightly broader.

Distribution: Fairly common throughout the state as shown by the following map:



Hosts: The definite host is unknown. The adults are commonly taken on weeds and grasses.

Eutettix albidus (Ball).

Phlepsius albidus Ball, Can. Ent., xxxii, p. 203, 1900.
Eutettix albidus Ball, Proc. Dav. Acad. Sci., xii, p. 51, pl. 2, fig. 10, 1907.
Eutettix albidus Van D., Cat. Hemip. N. A., p. 666, 1917.

Form: Rather small but fairly robust. Length, 3.75 to 4 mm. Vertex one-fourth longer on middle than next the eye, about twice as wide as long, disc barely depressed, broadly rounding with front, quite rounding apically. Pronotum over twice as wide as long, lateral margins short, posterior margin distinctly emarginate. Elytra moderately long, vertical, and appressed behind.

Color: Vertex creamy-white with six faint brown dots on anterior margin and disc slightly irrorate with brown. Pronotum pale, sometimes with a few brown irrorations. Elytra milky-white, sparsely marked with irregular brown pigment lines which are more distinct in the male, a black spot at tip of clavus and three smaller ones on basal half of clavus at the edge of the markings.

External genitalia: Female, last ventral segment about three times as long as the preceding, keeled, posterior margin slightly rounding and with a small median notch; pygofers stout, nearly equalling ovipositor, sparsely spined. Male, valve broad, margins slightly concave to broadly rounded apex; plates together forming a triangle as broad as long, margins spiny, pilose apices exceeded by the spiny pygofers.

Distribution: Specimens are at hand from Clark county.

Hosts: Doctor Ball gives *Atriplex confertifolia* as the host plant of this species.

Genus ALIGIA Ball.

Doctor Ball characterizes this genus as follows:

"Vertex short, sloping, rounding to front, without a definitely angled margin except near apex, transverse depression faint or curved posteriorly in the middle and ending at the ocelli; front long, wedge-shaped, margins not constricted between antennal sockets. Elytra subhyaline, the nervures distinct, dark, two cross nervures between the sectors and usually a number of supernumerary veinlets along costa and claval sutures."

None of the members of this genus have yet been reported from Kansas, but the following species should be found:

Aligia modesta (O. & B.).

Eutettix modesta O. & B., Dav. Acad. Sci., vii, p. 98, 1898.
Eutettix (*Aligia*) *modesta* Ball, Proc. Dav. Acad. Sci., xii, p. 58, pl. 3, fig. 4, 1907.
Eutettix modesta Van D., Cat. Hemip. N. A., p. 628, 1917.

Form: A moderately stout species. Length, 4.5 to 5.5 mm. Vertex barely longer on the middle than next the eye, two and one-half times as wide as long, disc sloping, rounding to the front, distinct transverse impression just back of the apex. Pronotum over twice as broad as long, lateral margins very short, humeral margins long, posterior margin very slightly concave. Elytra moderately long, two cross nervures between the sectors.

Color: Pale fulvous or tawny. Vertex whitish with a pair of apical spots, a pair of short lines in each basal angle and often the transverse depression, tawny. Pronotum faintly irrorate with tawny. Elytra reddish-fulvous, subhyaline, with whitish spots and more or less definite bands across the base and before the tip of the clavus. Face pale.

External genitalia: Female, last ventral segment over twice as long as the preceding, lateral angles broadly rounded, posterior margin truncate except for a broad but short rounding lobe on the median third; pygofers stout, widest at the middle, slightly exceeded by the ovipositor, sparsely spined apically. Male, valve broad and triangular, rounded apically; plates large, convex, nearly four times the length of the valve, apices acute, margins spiny.

Distribution: This species has not yet been reported from Kansas, but very likely occurs in the eastern part of the state.

Hosts: Doctor Ball records this as an oak-feeding species.

Genus MESAMIA Ball.

Doctor Ball describes this genus as follows:

"Vertex with the disc depressed, anterior margin usually elevated and acutely angled with the front, margin often slightly produced, front narrow, slightly constricted at antennal socket, then angularly widened to the ocelli; surface smooth polished, nearly flat above. Elytra subhyaline, the second cross nervure present (sometimes obscure) and the central anteapical cell slightly constricted. Usually with a number of supernumerary veinlets along the clavus and costa."

Three of the four species keyed below have been collected in Kansas.

KEY TO SPECIES.*

A. Species with fuscous markings or at least with fuscous nervures.
  B. A dark saddle on elytra between the cross nervures. *nigridorsum.*
  BB. Without a definite dark band.
    C. Size of *nigridorsum*, vertex depressed, with four spots on anterior margin, connected by a line posteriorly, with a broad band below vertex. *straminea.*
    CC. Smaller than *nigridorsum*, vertex flat, sometimes with a narrow line above and below margin. *coloradensis.*
AA. Species fulvous-yellow with light spots. *vitellina.*

Mesamia nigridorsum Ball.

Mesamia nigridorsum Ball, Proc. Dav. Acad. Sci., xii, p. 60, pl. 3, fig. 6; pl. 4, fig. 6, 1907.

Paramesus twiningi Van D., Trans. Am. Ent. Soc., xxi, p. 290, 1894.

Paramesus jucundus G. & B., Hemip. Colo., p. 84, 1895.

Eutettix nigridorsum DeL., Tenn. St. Bd. Ent., Bul. 17, p. 68, 1916.

Mesamia nigridorsum Van D., Cat. Hemip. N. A., p. 628, 1917.

Form: Length, 3.75 to 5 mm. Vertex one-third longer on middle than next the eye, not quite twice as broad as long, disc depressed, anterior margin elevated and acutely angled with front. Pronotum scarcely twice as broad as long, lateral margins somewhat shorter than the humeral. Elytra long, flaring, with characteristic venation, two cross nervures between the sectors, several cross veins along clavus and claval suture and with six or seven reflexed costal veins.

Color: Vertex white apically, back of which is an irregular black line connected anteriorly with two large quadrangular spots, disc brown. Pronotum brown anteriorly back of which is a light line containing two dark spots on either side, rest of pronotum brownish, irrorate with fuscous. Scutellum brown with one white spot on each margin and one apically. Elytra milky-white, nervures brown, a dark brown saddle across posterior two-thirds of clavus, apex and costal veinlets black. Face brownish, black above, arcs pale.

External genitalia: Female, last ventral segment long, posterior margin broadly and deeply emarginate and with a median lobe which is slightly notched apically; pygofers stout, exceeded by ovipositor, sparsely spined apically. Male, valve very small, posteriorly broadly rounded;

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* Adapted from key by Doctor Ball, Proc. Dav. Acad. Sci., xii, p. 60, 1907.

plates a little longer than basal width, margins spiny, acute apices equalling or exceeding pygofers.

Distribution: Taken in Douglas, Pottawatomie, Riley and Clark counties.

Hosts: Doctor Ball gives *Helianthus* as the host of this species.

Mesamia straminea (Osb.).

Paramesus stramineus Osb., Proc. Ia. Acad. Sci., v, p. 241, 1898.

Eutettix (Mesamia) straminea Ball, Proc. Dav. Acad. Sci., xii, p. 62, pl. 3, fig. 7, pl. 4, fig. 7, 1907.

Mesamia straminea Van D., Cat. Hemip. N. A., p. 628, 1917.

Form: That of *nigridorsum*. Length, 4.5 to 5.5 mm. Vertex slightly longer and more angled than in *nigridorsum*, about twice as wide as long, disc depressed, margin acute. Pronotum about twice as wide as long, lateral margins short. Elytra long and narrow, often flaring, two cross nervures between the sectors, central anteapical cell sometimes divided, with six or seven costal veinlets.

Color: Straw-colored with a greenish tinge. Vertex with white anterior and posterior margins, former with an interrupted black line often reduced to four spots, disc yellowish-green. Pronotum anteriorly yellowish-green, posteriorly darker, irrorate with brown, the two parts separated by a darker line which is produced medially. Scutellum olive-brown, basal angles with orange spot, and with seven light spots around the edge. Elytra milky-white, subhyaline, disc brownish, nervures brown, costal nervures and apex fuscous, three pairs of white spots along the suture. Face pale, darkening with dark bands above to a black line under the margin of the vertex.

External genitalia: Female, last ventral segment long, posterior margin broadly and deeply emarginate, with a median lobe which is slightly emarginate apically; pygofers broad, exceeded by ovipositor, sparsely spined. Male, valve very small, rounded posteriorly; plates together forming a triangle a little longer than broad, margins spiny, apices acute. exceeding the pygofers.

Distribution: Taken in Pottawatomie and Riley counties.

Hosts: Doctor Ball reports this on the rough-leaved species of *Helianthus*.

Mesamia coloradensis (G. & B.).

Allygus coloradensis G. & B., Hemip. Colo., p. 91, 1895.

Paramesus immaculatus Ball, Can. Ent., xxxvii, p. 211, 1905.

Eutettix (Mesamia) coloradensis Ball, Proc. Dav. Acad. Sci., xii, p. 63, 1907.

Paramesus coloradensis Tuck., Kans. Univ. Sci. Bul., iv, p. 66, 1907.

Mesamia coloradensis Van D., Cat. Hemip. N. A., p. 628, 1917.

Form: Like *straminea*, but smaller. Length, 3.75 to 4.5 mm. Vertex one-half longer on middle than next the eye, about twice as wide as long, depression slight, acutely angled with front, apex a trifle more pointed than in *straminea*. Pronotum about twice as wide as long, lateral margins short, broadly rounding with humeral margins. Elytra rather short with the two cross nervures characteristic of the group.

Color: Whitish, sometimes tinged with green or brown. Vertex unmarked or usually with thin interrupted marginal line and a pair of basal spots, brown or black. Pronotum usually unmarked or with disc irrorate with brown and a few dark spots behind the eyes. Elytra milky-white with nervures brown, sparsely reticulated with brown. Face pale, unmarked, or with dark bands darkening above.

External genitalia: Female, last ventral segment twice as long as the preceding, narrowed strongly on posterior half, posterior margin broadly and deeply emarginate, with a median lobe which has brown margins and is very slightly notched apically; pygofers broad, exceeded by ovipositor, sparsely spined on distal half. Male, valve small, rounded posteriorly; plates about equal in length to their combined basal width, margins spiny, acute apices exceeding pygofers.

Distribution: Taken in Ottawa county only.

Hosts: Doctor Ball gives *Artemesia dracunculoides* as the host plant of this species.

Mesamia vitellina (Fh.).

Acocephalus vitellinus Fh., Homop. N. Y. St. Cab., p. 57, 1851.
Jassus twiningi Uhl., Bul. U. S. Geol. Geog. Surv., iv, p. 511, 1878.
Selenocephalus vitellinus Van D., Psyche, v, p. 390, 1890.
Paremesus furcatus Osb., Can. Ent., xxxii, p. 285, 1900.
Paramesus vitellina Osb., 20th Rept. N. Y. St. Ent., p. 516, 1905.
Eutettix (*Mesamia*) *vitellina* Ball, Proc. Dav. Acad. Sci., xii, p. 67, pl. 4, fig. 2, 1907.
Eutettix vitellina Osb., Me. Agr. Exp. Sta., Bul. 238, p. 139, 1915.
Mesamia vitellina Van D., Cat. Hemip. N. A., p. 628, 1917.

Form: Our largest member of the genus. Length, 5.5 to 6.5 mm. Vertex long, almost as long as the pronotum, one-half longer on the middle than next the eye, less than twice as broad as long in the female, very slightly depressed, margin acute. Pronotum over twice as broad as long, lateral margins not greatly shorter than the humeral, posterior margin emarginate. Elytra long, venation indistinct, but with the two cross nervures between the sectors and several costal veinlets.

Color: Fulvous-yellow. Vertex yellow, unmarked. Pronotum fulvous with anterior margin yellow, with a fairly distinct median line and lateral ones, light. Scutellum pale, basal angles fulvous. Elytra golden or fulvous-yellow with darker oblique basal band and a parallel band ending on tip of clavus, darker, whole surface with white spots. Face yellow.

External genitalia: Female, last ventral segment nearly twice as long as preceding, narrowed posteriorly to broadly rounding lateral lobes, between which the posterior margin is emarginate with a strap-like median lobe; pygofers broad, exceeded by ovipositor, sparsely spined. Male, valve triangular, two-thirds as long as last ventral segment, obtuse apically; plates nearly four times the length of the valve, apices attenuate, acute, exceeding pygofers, margins spined.

Distribution: Not yet reported for Kansas, but should be found.

Hosts: Doctor Ball gives wild rose as the host plant of this species.

Genus PHLEPSIUS Fieb.

The members of this genus are generally robust species with vertex broad, usually distinctly longer on middle than next the eye and obtusely angled. Their chief characteristic is the marking of the elytra with brown ramose pigment lines which are not confined, as in *Eutettix,* to any particular part of the elytra. Due to these lines the species are, with few exceptions, brownish, but even in these exceptions, the ramose lines are found.

All of the twenty-one species keyed below have been found in Kansas.

KEY TO SPECIES.*

- A. Head narrower than the pronotum.
  - B. Species large, 7 mm. or over; head much narrower than pronotum; elytra long and narrow.
    - C. Reddish-brown, length, 9 to 10 mm. *majestus.*
    - CC. Paler, grayish or cinereous, length 9 mm. or less. *spatulatus.*
  - BB. Species smaller, 7 mm. or less; head slightly narrower than pronotum; stouter species with shorter elytra.
    - C. Sutural margin of elytra not definitely marked with ivory lobate markings.
      - D. Elytra marked with numerous ivory areoles. *areolatus.*
      - DD. Elytra without ivory areoles. *superbus.*
    - CC. Sutural margin of elytra definitely marked with ivory lobate markings.
      - D. Species longer, length 6 mm. or over.
        - E. Rather slender species, female segment excavated to base or nearly so. *excultus.*
        - EE. More robust species; female segment excavated half way to base. *decorus.*
      - DD. Species smaller, length less than 6 mm. *ovatus.*
- AA. Head as wide or wider than pronotum.
  - B. Vertex short, but little longer on the middle than next the eye, edge obtuse.
    - C. General color yellowish or brownish, closely inscribed.
      - D. Uniformly colored species.
        - E. Distinctly robust species, narrowed apically.
          - F. Margin of vertex black on either side of a light tip. *lascivious.*

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* Adapted from keys by Van Duzee, Trans. Am. Ent. Soc., xix, p. 65, 1892, and De Long, Tenn. St. Bd. Ent., Bul. 17, p. 68, 1916.

AA. Head as wide or wider than pronotum—*concluded.*
- FF. Margin of vertex not black.
  - G. Species dark or dirty brown.
    - H. Species not over 5.5 mm. long. *altus.*
    - HH. Species longer, 6 mm. or over. *incisus.*
  - GG. Species fulvous-brown; length, 6 to 7 mm. *turpiculus.*
- EE. More slender species, elytra narrowed apically.
  - F. Species about 6 mm. long: female segment not produced at sides into distinct lobes.
    - G. Female segment excavated, with median tooth; male valve long, apex rounded. *irroratus*
    - GG. Female segment truncate, without median tooth; male valve short and truncated. *truncatus.*
  - FF. Species smaller, less than 6 mm. long; female segment produced at sides into distinct lobes. *lobatus*
- DD. Vertex, pronotum and scutellum yellow, elytra dark brown. *collitus.*
- CC. General color cinereous, sparsely inscribed. *cinereus.*
- BB. Vertex longer, distinctly longer on middle than next the eye; disc depressed, edge acute or subacute.
  - C. Elytra closely dotted, not reticulated, with some of the dots in irregular lines. *punctiscriptus.*
  - CC. Elytra reticulated.
    - D. Size medium, 6 to 7 mm. long.
      - E. Head, pronotum and scutellum not distinctly yellow, elytra with two clearer transverse bands indicated. *apertus.*
      - EE. Head, pronotum and scutellum pale yellow, elytra evenly inscribed. *fulvidorsum.*
    - DD. Size large, 7 mm. or over.
      - E. Length, 8 to 8.5 mm.; elytra distinctly narrowed apically, female segment not produced medially. *nebulosus*
      - EE. Length, 7 to 7.5 mm.; elytra scarcely narrowed apically, female segment produced medially. *solidaginis.*

Phlepsius majestus O. & B.

Phlepsius majestus O. & B., Proc. Ia. Acad. Sci., iv, p. 229, pl. 26, fig. 6, 1897.
Phlepsius majestus Osb., 20th Rept. N. Y. St. Ent., p. 533, 1905.
Phlepsius majestus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 76, 1916.
Phlepsius majestus Van D., Cat. Hemip. N. A., p. 667, 1917.
Phlepsius majestus Ball, Ann. Ent. Soc. Am., xi, p. 382, 1918.
Phlepsius majestus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 101, 1919.

Form: Our largest Phlepsid, elongate. Length, 9 to 10 mm. Head much narrower than pronotum; vertex distinctly produced, twice as broad as long, front long and narrow. Pronotum over twice as broad as long, broadest at lateral angles, anterior margin strongly convex, lateral margins longer than humeral, posterior margin slightly emarginate. Elytra long and narrow, greatly exceeding abdomen.

Color: Reddish-brown; vertex yellowish, two apical and two basal spots black, disc with a large black transverse band on each side, median longitudinal line brown. Pronotum yellowish marked with brown or black. Scutellum yellowish marked with brown on basal angles and apically. Elytra pale yellow to milky-white marked with reddish-brown irrorations.

External genitalia: Female, last ventral segment one-third longer than preceding, posterior margin emarginate, with two distinct median points between which is an incision extending fully half way to base; pygofers broad and short, equalling ovipositor, spiny medially on distal half. Male, last ventral segment truncate; valve scarcely twice as broad as long, roundingly produced to very broad apex; plates long, spiny margins convexly rounding to blunt tips which exceed the short spiny pygofers.

Distribution: Taken in Douglas and Pottawatomie counties.

Hosts: De Long reports sweeping this species from weeds in open woods.

Phlepsius spatulatus Van D.

Phlepsius spatulatus Van D., Trans. Am. Ent. Soc., xix, p. 78, 1892.
Phlepsius personatus Bak., Can. Ent., xxx, p. 30, 1898.
Phlepsius spatulatus Snow, Kans. Univ. Sci. Bul., ii, p. 349, 1904.
Phlepsius spatulatus Van D., Cat. Hemip. N. A., p. 667, 1917.
Phlepsius spatulatus Ball, Ann. Ent. Soc. Am., xi, p. 384, 1918.

Form: Smaller than *majestus*. Length, 7 to 9 mm. Head much narrower than the pronotum; vertex one-fourth longer on middle than next the eye, not quite twice as wide as long. Pronotum about twice as wide as long, lateral and humeral margins about equal, posterior margin slightly emarginate, transversely wrinkled.

Color: Pale grayish or cinereous, sometimes fulvous-brown. Vertex whitish, with broad transverse brown band between eyes and usually with brown spots before and behind this. Pronotum irrorate with brown and yellow. Scutellum yellowish. Elytra cinereous, regularly inscribed with brown, darker apically. Face pale or yellowish, marked with brown arcs.

External genitalia: Female, last ventral segment half longer than the preceding, longest at the rounding lateral lobes between which it is emarginate, with a pair of stout acute teeth in this emargination and between them an acute median notch; pygofers broad and short, slightly exceeded by ovipositor, sparsely spined. Male, last ventral segment as long as preceding, valve narrow, two to two and one-half times as wide as long, obtusely angulated, or rounded apically; plates long, spiny margins at first convex and then suddenly narrowed at proximal third, then tapering regularly to long attenuate and acute tips which exceed the spiny pygofers, with a brown line, parallel to margin, on the proximal third.

Distribution: Found in western Kansas, specimens having been taken in Reno, Stafford, Thomas and Sherman counties.

Hosts: Unknown.

Phlepsius areolatus Bak.

Phlepsius areolatus Bak., Can. Ent., xxx, p. 30, 1898.
Phlepsius areolatus Van D., Cat. Hemip. N. A., p. 668, 1917.

Form: A stout robust species. Length, 5.5 to 6.75 mm. Head narrower than pronotum; vertex not quite twice as broad as long, rounded apically, disc strongly depressed, the margin thin. Pronotum about twice as long as the vertex, twice as broad as long, widest at lateral angles, humeral margins a little longer than the lateral, posterior margin about truncate, transversely wrinkled. Elytra moderately long, flaring at tips.

Color: Cinereous, marked with dark brown; vertex yellowish with four black spots along margin, the median pair larger and triangular, with two small apical spots, and disc with two large brown patches. Pronotum irrorate with yellowish and brown. Scutellum yellowish or whitish, marked with brown. Elytra milky-white, irrorate with dark brown, with a strong areolate appearance. Face yellowish irrorate with brown.

External genitalia: Female, last ventral segment half longer than the preceding, lateral margins strongly narrowed on their distal half, hind margin broadly emarginate and with a small median notch; pygofers broad and short, exceeded by ovipositor, sparsely bristly. Male, last ventral segment longer than preceding; valve very small, rounded posteriorly; plates broad, together forming a triangle broader than long, spiny margins narrowed evenly to the obtuse tips which exceed the very short, bristly pygofers.

Distribution: Sherman, Pottawatomie and Douglas counties.

Hosts: Unknown.

Phlepsius superbus Van D.

Phlepsius superbus Van D., Trans. Am. Ent. Soc., xix, p. 81, 1892.
Phlepsius superbus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 77, 1916.
Phlepsius superbus Van D., Cat. Hemip. N. A., p. 668, 1917.
Phlepsius superbus Ball, Ann. Ent. Soc. Am., xi, p. 383, 1918.
Phlepsius superbus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 98, 1919.

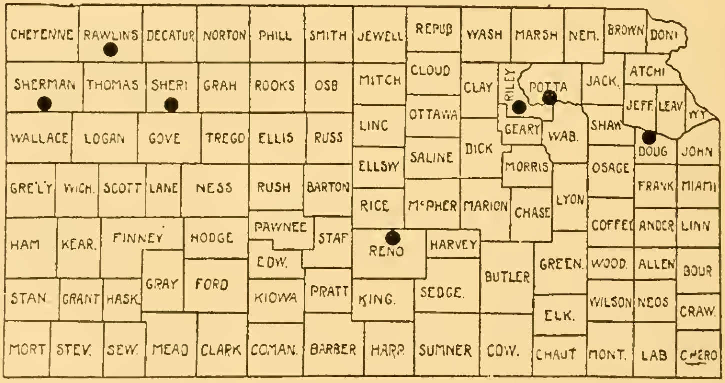
Form: A medium-sized, semirobust species. Length, 6.25 to 7 mm. Head slightly narrower than pronotum. Vertex half longer on middle than next the eye, twice as broad as long, obtusely but distinctly angulate. Pronotum twice as long as vertex, twice as wide as long, anterior margin strongly convex, humeral margins longer than the lateral, posterior margin clearly concave, transversely wrinkled. Scutellum large.

Elytra long, distinctly narrowed apically, slightly flaring, appendix present.

Color: Yellowish or yellow-fulvous; vertex and pronotum yellowish, irrorate with brown, scutellum lighter, with traces of two yellow lines. Elytra yellowish, nearly evenly inscribed with brown, white lobate sutural line not distinct. Face yellowish, irrorate with brown and marked with darker arcs.

External genitalia: Female, last ventral segment very characteristic, over twice longer than preceding, strongly narrowed posteriorly and with a very large median incision reaching nearly to base, making the segment appear almost like two widely-separated lateral lobes; pygofers very broad, slightly exceeded by ovipositor, distal half bristly. Male, last ventral segment slightly longer than preceding; valve small, narrow, posteriorly rounded; plates very broad, short, inner margins contiguous, outer margins broadly rounding, together describing a semicircle, slightly exceeded by the bristly pygofers, and with a row of spines, well in, but parallel to outer margin.

Distribution: Found throughout the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
FRANK
MIAMI
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
EDW.
BUTLER
GREEN.
WOOD.
ALLEN
BOUR
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
WILSON
NEOS
ELK.
CRAW.
MORT
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: De Long records sweeping this species from pasture and grass land.

Phlepsius excultus (Uhl.).

Jassus excultus Uhl., Bul. U. S. Geol. Geog. Surv., iii, p. 467, 1877.
Phlepsius excultus Van D., Trans. Am. Ent. Soc., xix, p. 80, 1892.
Phlepsius excultus Osb., 20th Rept. N. Y. St. Ent., p. 534, 1905.
Phlepsius excultus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 77, 1916.
Phlepsius excultus Van D., Cat. Hemip. N. A., p. 667, 1917.
Phlepsius excultus Ball, Ann. Ent. Soc. Am., xi, p. 387, 1918.
Phlepsius excultus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 97, 1919.
(*Jassus infumatus* and *scalaris* Uhl., MS.) in collections.

Form: Semi-slender species. Length, 6 to 7 mm. Head slightly narrower than pronotum; vertex less than twice as wide as long, half longer on middle than next the eye, disc sloping, broadly rounded with front, obtusely angled apically. Pronotum twice as wide as long, slightly emarginate posteriorly, lateral margins as long as humeral, posterior half of disc strongly wrinkled, pits distinct. Elytra long, not strongly narrowed apically, appendix distinct.

Color: Vertex, pronotum and scutellum pale to orange-yellow, irrorate with light brown; vertex with two brown spots on posterior margin near the eyes, pronotum usually with four spots along anterior margin and scutellum with two spots on anterior margin. Elytra light cinereous, closely and evenly inscribed with dark brown and with the trilobate sutural line ivory-white. Face fulvous-yellow, heavily irrorate with dark brown.

External genitalia: Female, last ventral segment with lateral angles triangularly or truncately produced, broadly incised medially nearly or quite to base, exposing base of ovipositor with its overlapping plates; pygofers broadest at the middle, exceeded by the ovipositor, spined distally. Male, last ventral segment longer than the preceding; valve broad but short, rounded posteriorly; plates broad basally, triangular, submarginally spined margins somewhat concavely narrowed to acute apices which exceed the spiny pygofers.

Distribution: Reported by Van Duzee from Kansas.

Hosts: Unknown.

Phlepsius decorus O. & B.

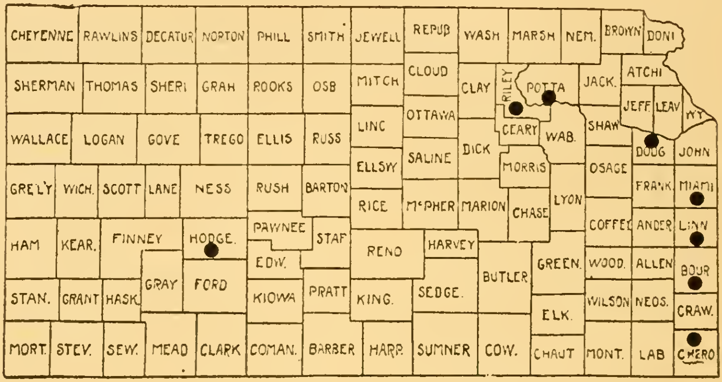
Phlepsius decorus O. & B., Proc. Ia. Acad. Sci., iv, p. 230, pl. 26, fig. 7, 1897.
Phlepsius decorus Osb., 20th Rept. N. Y. St. Ent., p. 533, 1905.
Phlepsius decorus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 141, 1915.
Phlepsius decorus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 76, 1916.
Phlepsius decorus Van D., Cat. Hemip. N. A., p. 668, 1917.
Phlepsius decorus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 99, 1919.

Form: Broader and shorter than *excultus*. Length, 5.5 to 6.25 mm. Head slightly narrower than pronotum; vertex one-third longer on middle than next the eye, nearly or quite twice as wide as long, disc flat, rather acutely angled with the front, obtusely angled apically. Pronotum short, about half longer than the vertex, usually more than twice as wide as long, humeral margins distinctly longer than the lateral, posterior two-thirds transversely wrinkled. Elytra short and wide, broadly flaring.

Color: Usually dark brown. Vertex white, with a few broad marginal markings and with brown irrorations forming a broad transverse band between the eyes, and a pair of more or less definite dark spots near posterior margin. Pronotum yellowish marked with brown, with two crescentiform dashes near posterior margin and a black spot behind each eye. Scutellum yellowish with two spots on disc and two on anterior margin, fuscous. Elytra milky-white to nearly smoky, marked with dark brown nervures and irrorations, scutellum and sutural margins usually white, the latter with the three ivory-white lobate markings, usually distinct. Face yellowish, strongly irrorate with brown.

External genitalia: Female, last ventral segment little longer than preceding, lateral margins quite short, posterior margin truncate and with a broad median notch reaching half or two-thirds the distance to the base; pygofers broad, exceeded by ovipositor, very sparsely spined on distal half. Male, last ventral segment longer than preceding; valve small, triangular, obtusely angled apically; plates broad and short, inner margins contiguous, submarginally spined, lateral margins convexly rounding to obtuse apices which are distinctly exceeded by the preapically spiny pygofers.

Distribution: Fairly common in eastern Kansas as shown by its distribution on the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GREELY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK.
MIAMI
HAM
KEAR.
FINNEY
HODGE.
PAWNEE
STAF
RENO
HARVEY
COFFEE
ANDER
LINN
EDW.
GRAY
FORD
BUTLER
GREEN.
WOOD.
ALLEN
BOUR
STAN.
GRANT
HASK
KIOWA
PRATT
KING.
SEDGE.
ELK.
WILSON
NEOS.
CRAW.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Found on pasture grasses.

Phlepsius ovatus Van D.

Phlepsius ovatus Van D., Trans. Am. Ent. Soc., xix, p. 79, 1892.
Phlepsius ovatus G. & B., Hemip. Colo., p. 94, 1895.
Phlepsius ovatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 75, 1916.
Phlepsius ovatus Van D., Cat. Hemip. N. A., p. 668, 1917.
Phlepsius ovatus Ball, Ann. Ent. Soc. Am., xi, p. 387, 1918.

Form: A small robust species, smaller than two preceding. Length, 5 to 6 mm. Head slightly narrower than pronotum; vertex one-half longer on middle than next the eye, nearly or quite as wide as long, obtusely rounding with front, obtusely angled apically. Pronotum a little over half longer than the vertex, twice as broad as long, lateral margins nearly or quite as long as the humeral, posterior margins slightly emarginate, posterior two-thirds transversely wrinkled. Elytra short and broad, moderately exceeding the abdomen.

Color: Usually lighter than *decorus*, yellowish-white inscribed with dark brown. Vertex yellow, irrorate with light brown, the latter forming two spots on either side of the apex and two broad transverse bands on the disc, connected by a short curved line with the posterior margin. Pronotum with brown marks which are less prominent on the posterior portion of the disc. Scutellum with large brown triangles in basal angles.

Elytra whitish, heavily inscribed with brown nervures and ramose markings, lighter on costa, and suture with distinct ivory trilobate markings. Face yellow, marked with brown irrorations and arcs.

External genitalia: Female, last ventral segment broad and short, roundingly narrowed posteriorly, posterior margin broadly excavated to nearly one-half the distance to the base and with a median notch extending nearly to the base; pygofers broad, slightly exceeded by ovipositor, apical half bristly. Male, last ventral segment longer than preceding; valve narrow, triangular, about one-half wider than long, apex acute; plates broad and short, submarginally spined, margins convexly rounding to obtuse apices which extend beyond the valve less than the length of the latter and nearly or quite equalling the short bristly pygofers.

Distribution: Taken in Pottawatomie and Morton counties.

Hosts: The only host plant record is that given by De Long who swept a single female from pasture grasses.

Phlepsius lascivius Ball.

Phlepsius lascivius Ball, Can. Ent., xxxii, p. 200, 1900.
Phlepsius lascivius Van D., Cat. Hemip. N. A., p. 670, 1917.

Form: Medium sized, semi-robust species. Length, 6 to 6.5 mm. Head as wide as the pronotum; vertex one-third longer on middle than next the eye, two and one-half to three times as wide as long, broadly rounded apically. Pronotum twice as wide as long, humeral and lateral margins about equal in length, rounding into each other, posterior margins somewhat emarginate. Elytra broad and moderately long, flaring behind, claval nervures parallel, not united by a transverse nervure.

Color: Faintly light brown. Vertex, pronotum and scutellum yellowish, irrorate with brown; elytra whiter. Vertex with irregular black markings on either side of the white apex, back of this a lighter area and then irrorate with fulvous brown to the base. Scutellum with two light spots on margin and at apex, and a dark spot on each margin. Elytra finely and evenly inscribed with fuscous dots which fuse into lines costally and apically. Face heavily irrorate with fuscous, black above.

External genitalia: Female, last ventral segment very long, slightly narrowed posteriorly, posterior margin truncate, with a small median notch between which and the lateral angles the margin is slightly concave; pygofers not as broad as in preceding species, slightly exceeded by ovipositor and sparsely spined. Male, valve very broad, triangular, with obtuse or subacute apex; plates large, broad at base, narrowing rapidly on basal third and then produced as parallel-margined, bluntly pointed, divergent lobes which completely hide and exceed the pygofers.

Distribution: Taken in Gove county only.

Hosts: Unknown.

Phlepsius altus O. & B.

Phlepsius altus O. & B., Ia. Acad. Sci., iv, p. 228, pl. 26, fig. 5, 1897.
Phlepsius altus O. & B., Proc. Dav. Acad. Sci., vii, p. 99, pl. 6, fig. 3, 1898.
Phlepsius mimus Bak., Ent. News, ix, p. 67, 1898.
Phlepsius mimus Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 225. 1909.
Phlepsius altus Van D., Cat. Hemip. N. A., p. 670, 1917.

Form: Small and stout. Length, 5.5 mm. Head slightly wider than pronotum; vertex one-third longer on middle than next the eye, three times as wide as long, obtusely angled apically. Pronotum twice as wide as long, basal half transversely wrinkled, lateral margins short, humeral margins longer, posterior margin slightly emarginate. Elytra short, flaring, claval veins slightly approaching each other near the middle.

Color: Dark fulvous; vertex, pronotum and scutellum soiled yellowish-white, usually nearly uniformly irrorate with dark brown, posterior two-thirds of pronotum often darker. Elytra whitish, heavily inscribed with dark brown, leaving spots here and there. Face yellowish-white, nearly uniformly irrorate with dark brown.

External genitalia: Female, last ventral segment over twice longer than preceding, narrowed posteriorly, posterior margin broadly emarginate nearly one-third of distance to the base, emargination with a deep median slit, lateral angles lobular and appressed to the pygofers; pygofers semirobust, exceeded by the ovipositor, very sparsely spined. Male, last ventral segment as long as preceding; valve broad, triangular, slightly longer than ultimate segment, margins indented just before the acutely pointed apex; plates broad, ventrally convex, submarginally spined margins narrowing to obtuse tips which exceed the pygofers.

Distribution: Taken in Pottawatomie, Riley, Gray and Sheridan counties.

Hosts: Osborn and Ball report this species as abundant on *Bouteloua hirsuta*.

Phlepsius incisus Van D.

Phlepsius incisus Van D., Trans. Am. Ent. Soc., xix, p. 73, 1892.
Phlepsius incisus Osb., 20th Rept. N. Y. St. Ent., p. 533, 1905.
Phlepsius incisus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 143, 1915.
Phlepsius incisus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 71, 1916.
Phelpsius incisus Van D., Cat. Hemip. N. A., p. 570, 1917.

Form: Rather robust, larger than *altus*. Length, 6 to 6.5 mm. Head slightly wider than pronotum; vertex slightly longer on middle than next the eye, over three times as wide as long, disc depressed, margin acute, apex obtusely rounded. Pronotum about three times as long as vertex, twice as broad as long, lateral margins short, posterior margin emarginate, not transversely wrinkled. Elytra broad, not narrowed apically, appendix distinct.

Color: Yellowish, irrorate with testaceous-brown. Vertex yellowish, irrorate with light brown. Pronotum yellowish with posterior two-thirds heavily irrorate with light brown. Scutellum pale, somewhat maculate with brown. Elytra cinereous, heavily irrorate with dark brown, tips of claval veins often white. Face yellowish, heavily irrorate with brown.

External genitalia: Female, last ventral segment twice the length of the preceding, keeled, posterior margin obtusely produced with a broad and deep median notch. Male, last ventral segment widened posteriorly; valve large, very broad, triangular, obtusely pointed; plates large, broad basally, spiny margins sinuately narrowing to broad rounded apices which exceed the pygofers.

Distribution: Taken in Pottawatomie county.

Hosts: Unknown.

Phlepsius turpiculus Ball.

Phlepsius turpiculus Ball, Can. Ent., xxxii, p. 200, 1900.
Phlepsius turpiculus Van D., Cat. Hemip. N. A., p. 671, 1917.

Form: Rather large and robust. Length, 6 to 7 mm. Head as wide as the pronotum; vertex slightly longer on middle than next the eye, over three times as broad as long, obtusely rounding with front, obtusely angled at apex. Pronotum with lateral margins shorter than the humeral, posterior margin slightly emarginate, disc transversely wrinkled. Elytra long, narrowing apically.

Color: Dirty-yellow, irrorate with fulvous. Vertex, pronotum, and scutellum yellowish, marked with dirty fulvous, margins of latter sometimes with two dark spots. Elytra whitish, heavily irrorate with light or dark brown. Face yellowish, quite evenly irrorate with brown.

External genitalia: Female, last ventral segment twice as long as the preceding, posterior margin slightly notched medially, either side of which it is sinuate to the prominent lateral angles, pygofers semi-robust, long, usually equalling or slightly exceeding the ovipositor, rather spiny except on basal third. Male, last ventral segment wider than preceding; valve large and broad, triangular, margins indented midway to the obtuse apex; plates four times the length of the valve, slightly constricted basally, then broadening before narrowing again to long finger-like processes whose acute tips exceed the pygofers. A brown line, parallel to the margin and ending in a brown basal spot, on the proximal half of the plates.

Distribution: This species occurs in western Kansas, specimens having been taken in Thomas and Morton counties.

Hosts: Unknown.

Phlepsius irroratus (Say).

(Pl. 14, figs. 1-2.)

Jassus irroratus Say, Jl. Acad. Nat. Sci. Phila., vi, p. 308, 1831; Compl. Writ., ii, p. 384.
Jassus testudinarius Burm., Genera Ins., i, pl. 14, 1838.
Jassus inornatus Pack., U. S. Ent. Comm., Bul. 7, p. 80, 1881.
Allygus irroratus Uhl., Stand. Nat. Hist., ii, p. 245, 1884.
Phlepsius irroratus Van D., Ent. Am., vi, p. 93, 1890.
Phlepsius irroratus Van D., Trans. Am. Ent. Soc., xix, p. 71, 1892.

Phlepsius irroratus Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Phlepsius irroratus Osb., 20th Rept. N. Y. St. Ent., p. 533, 1906.
Phlepsius irroratus Osb., U. S. Dept. Agr., Bur. Ent., Bul. 108, p. 94, fig. 25, 1912.
Phlepsius irroratus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 139, 1915.
Phlepsius irroratus Gibs., Can. Ent., xlviii, p. 178, 1916.
Phlepsius irroratus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 72, 1916.
Phlepsius irroratus Van D., Cat. Hemip. N. A., p. 671, 1917.
Phlepsius irroratus Fent., Ohio Jl. Sci., xviii, p. 185, 1918.
Phlepsius irroratus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 90, 1919.

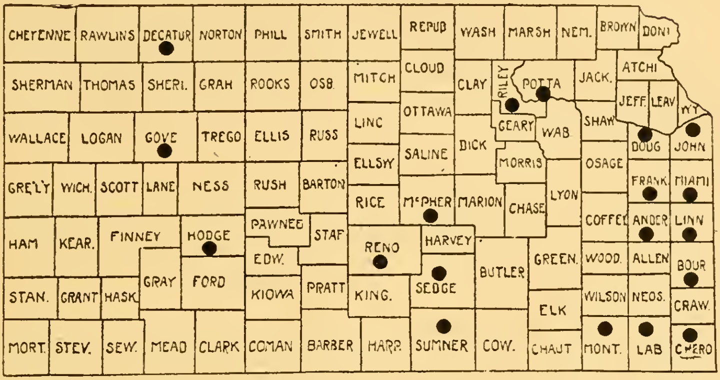
Form: A rather slender and elongate species. Length, 5.5 to 7 mm. Head as wide as pronotum; vertex one-third longer at middle than next the eye, over twice as wide as long, obtusely angled apically. Pronotum long, barely twice as wide as long, anterior margin strongly convex, lateral margins short, posterior margin slightly emarginate. Elytra long, narrowed apically.

Color: Grayish to yellowish, strongly and evenly inscribed. Vertex yellowish with an apical median line and spots on posterior margin whitish. Disc of pronotum more heavily irrorate than margins. Scutellum irrorate, with two or three marginal dark spots, an apical and two preapical marginal spots, white. Elytra whitish with fuscous nervures and closely inscribed with fuscous. Face yellowish, closely irrorate with fuscous.

External genitalia: Female, last ventral segment twice as long as preceding, rounded laterally, rounded lateral angles exceeded in length by three median teeth, the wider middle one separated by deep excavations from the outer two; pygofers rather slender, widest at the middle, exceeded by ovipositor, spined on apical half. Male, valve as broad as last ventral segment, triangular, apex rounded; plates broad basally, then narrowing to constriction near middle, and then broadening to obtusely pointed apices, each with a row of submarginal spines and bearing soft silky hairs, greatly exceeding the very short apically bristled pygofers.

Internal male genitalia: Styles triangular, very large basally, with a long finger-like terminal process which is strongly roughened, especially on the lateral margin; connective Y-shaped, with the cleft deep and more strongly chitinized on outer part, stem ending in a broad base; œdagus broad basally, gradually widening to an enlarged tip which is serrate, and with a small dorsal process for attachment to anal tube.

Distribution: This is our commonest Phlepsid. It is found throughout the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY.
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG
JOHN
SALINE
DICK
MORRIS
OSAGE
ELLSW
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK.
MIAMI
PAWNEE
COFFEE
ANDER.
LINN
HAM
KEAR.
FINNEY
HODGE
STAF
RENO
HARVEY
EDW.
GREEN.
WOOD.
ALLEN
BOUR
BUTLER
GRAY
FORD
STAN.
GRANT
HASK.
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS.
CRAW.
ELK
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: One of our most destructive leaf hoppers. Common on grasses, grains, alfalfa, and clover.

Phlepsius truncatus Van D.

Phlepsius truncatus Van D., Trans. Am. Ent. Soc., xix, p. 72, 1892.
Phlepsius truncatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 72, 1916.
Phlepsius truncatus Van D., Cat. Hemip. N. A., p. 672, 1917.
Phlepsius truncatus Fent., Ohio Jl. Sci., xviii, p. 185, 1918.

Form: Similar to *irroratus*, narrow and elongate. Length, 5.5 to 6.25 mm. Head slightly wider than pronotum; vertex one-fourth longer on middle than next the eye, over twice as broad as long, disc slightly transversely depressed, obtusely angulate apically. Pronotum slightly over twice the length of the vertex, lateral margins shorter than the humeral, posterior margin slightly emarginate, without transverse wrinkles. Elytra broader than in *irroratus*, narrowed apically.

Color: A trifle darker than *irroratus*. Vertex yellowish, irrorate with brown, sometimes with whitish spots on posterior margin. Pronotum with disc darker than margins. Scutellum pale with two black spots on each margin. Elytra whitish, very closely inscribed with brown. Face yellowish, closely and evenly inscribed with brown.

External genitalia: Female, last ventral segment twice as long as the preceding, lateral margins sinuate, posterior margin truncate, lateral angles rounded; pygofers rather long and narrow, slightly exceeded by the ovipositor, sparsely spined distally. Male, valve as broad as last ventral segment, triangular, obtusely rounded apically; plates wide, not quite four times as long as the valve, submarginally spined margins sinuately tapering to obtuse apices which greatly exceed the very short, apically bristled pygofers.

Distribution: Taken in Riley and Pottawatomie counties.

Hosts: Found on grasses with *irroratus*.

Phlepsius lobatus Osb.

Phlepsius lobatus Osb., Proc. Ia. Acad. Sci., v, p. 247, 1898.
Phlepsius lobatus Van D., Cat. Hemip. N. A., p. 673, 1917.

Form: Much like preceding species, but smaller. Length, 5.5 to 5.75 mm. Head as wide as pronotum; vertex one-third longer at middle than next the eye, over twice as wide as long, obtusely angled apically. Pronotum over twice as wide as long, lateral margins short, posterior margin slightly emarginate, transverse wrinkles on basal half indistinct. Elytra long, narrowed apically.

Color: Light brown. Vertex, pronotum, and scutellum dirty-yellow, evenly inscribed with light brown, disc of pronotum sometimes darker. Elytra whitish, evenly irrorate with dark brown except on costal area where irrorations tend to form spots. Face yellowish, quite evenly irrorate with brown.

External genitalia: Female, last ventral segment very long, strongly narrowed posteriorly, with two distinct lateral lobes, between which the margin is deeply and truncately incised, the median portion slightly produced, carinate, and with a very small incision; pygofers long and narrow, barely exceeded by the ovipositor, spiny on distal half. Male, valve triangular, obtusely angled; plates broad, spined margins tapering slightly sinuately to obtuse apices which greatly exceed the short pygofers.

Distribution: Taken in Riley and Pottawatomie counties.

Hosts: Unknown.

Phlepsius collitus Ball.

Phlepsius collitus Ball, Can. Ent., xxxv, p. 227, 1903.
Phlepsius collitus Osb., Ohio Nat., v, p. 275, 1905.
Phlepsius collitus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 142, 1915.
Phlepsius collitus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 73, 1916.
Phlepsius collitus Van D., Cat. Hemip. N. A., p. 672, 1917.
Phlepsius collitus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 95, 1919.

Form: Rather slender and elongate. Length, 5.5 to 6 mm. Head as wide as pronotum; vertex scarcely longer on middle than next the eye, three times as wide as long, disc convex, obtusely rounded apically. Pronotum two and one-half times as long as vertex, strongly convex anteriorly, lateral margins shorter than humeral, posterior margin angularly concave. Elytra long and narrow.

Color: Vertex, pronotum, and scutellum fulvous. Vertex mottled with brown, often with two darker spots basally. Pronotum often with disc darker than margins which are marked with brown. Scutellum with two dark spots on each lateral margin. Elytra whitish hyaline, heavily inscribed with brown, with suggestions of two whitish bands starting from the first and the third of the three white spots on the clavus. Face yellowish or fulvous, heavily irrorate with brown.

External genitalia: Female, last ventral segment half longer than the preceding, narrowed posteriorly, emarginate between the lateral lobes, the median third roundingly produced and medially notched; spiny pygofers long and narrow, very slightly exceeded by the ovipositor. Male, valve broad and triangular, obtuse apically; plates broad and convex, submarginally spined margins narrowing to obtuse tips which greatly exceed the short pygofers.

Distribution: Taken in Cherokee county.

Hosts: De Long reports this species as abundant on grasses and weeds.

Phlepsius cinereus Van D.

Phlepsius cinereus Van D., Trans. Am. Ent. Soc., xix, p. 68, 1892.
Phlepsius cinereus Van D., Bul. Buf. Soc. Nat. Sci., viii, No. 5, p. 69, 1907.
Phlepsius cinereus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 70, 1916.
Phlepsius cinereus Van D., Cat. Hemip. N. A., p. 672, 1917.
Phlepsius cinereus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 88, 1919.

Form: Moderately large and elongate. Length, 5.5 to 7 mm. Head as wide as pronotum; vertex short, very slightly longer at middle than next the eye, three times as wide as long, nearly rounded apically. Pronotum nearly three times as long as vertex, lateral margins shorter than humeral, posterior margin slightly emarginate. Elytra moderately long and broad, apically flaring.

Color: The lightest of the Kansas species, light cinereous with pale irrorations. Vertex evenly inscribed though often with two darker basal spots. Disc of pronotum often darker. Scutellum with two black spots on each margin and often a pair on disc. Elytra sparsely inscribed. Face yellowish-white, faintly inscribed.

External genitalia: Female, last ventral segment twice as long as preceding, slightly narrowed posteriorly, lateral angles broadly rounding, posterior margin concave between lateral angles and the median notched tooth; pygofers rather stout, constricted basally, exceeded by ovipositor, sparsely spined on distal half. Male, valve broad, longer than ventral segment, triangular, apex obtuse; plates broad, over twice the length of the valve, submarginally spined margins slightly constricted basally, then tapering to obtuse apices which exceed the pygofers.

Distribution: Taken in Logan county.

Hosts: Van Duzee reports taking this species on low tangled vines.

Phlepsius punctiscriptus Van D.

Phlepsius punctiscriptus Van D., Trans. Am. Ent. Soc., xix, p. 75, 1892.
Phlepsius punctiscriptus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 74, 1916.
Phlepsius punctiscriptus Van D., Cat. Hemip. N. A., p. 673, 1917.

Form: Medium-sized, rather wedge-shaped. Length, 5.75 to 7 mm. Head slightly wider than pronotum; vertex at least half longer at middle than next the eye, two and one-half times as wide as long, disc depressed, margin subacute. Pronotum twice as long as vertex, lateral margins shorter than humeral, posterior margin slightly emarginate, disc transversely wrinkled. Elytra rather long and broad, usually vertical apically, appearing to narrow the insect posteriorly.

Color: Somewhat darker than *cinereus.* Vertex yellowish-white, not inscribed along most of anterior margin, but brown back of this. Pronotum and scutellum also yellowish-white, quite evenly inscribed with fulvous brown, disc of pronotum often darker, tip of scutellum white. Elytra milky-white, dotted with fine brown points, apically darker. Face yellowish-white, marked with light brown.

External genitalia: Female, last ventral segment twice as long as the preceding, lateral margins strongly narrowed near apex to the obtuse lateral lobes between which the posterior margin is slightly emarginate, with the median portion produced and broadly and shallowly notched; pygofers broad, widest at the middle, slightly exceeded by the ovipositor, sparsely bristled on the distal half. Male, valve about half as long as wide, obtusely angled apically; plates broad basally, nearly four times the length of the valve, the submarginally spined margins narrowing to the long acute tips which greatly exceed the short pygofers.

Distribution: This species has been taken in Riley, Pottawatomie, and Gove counties.

Hosts: Unknown.

Phlepsius apertus Van D.

Phlepsius apertus Van D., Trans. Am. Ent. Soc., xix, p. 76, 1892.

Phlepsius apertus Osb., 20th Rept. N. Y. St. Ent., p. 532, 1905.

Phlepsius apertus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 140, 1915; Bul. 248, p. 79, 1916.

Phlepsius apertus Van D., Cat. Hemip. N. A., p. 673, 1917.

Phlepsius apertus Fent., Ohio Jl. Sci., xviii, p. 185, 1918.

Form: Medium-sized, fairly robust, posteriorly narrowed. Length, 5 to 6.5 mm. Head as wide as pronotum; vertex distinctly produced medially, nearly one-half longer on middle than next the eye, disc depressed posteriorly, apex distinctly obtusely angular, margin subacute. Pronotum twice as long as vertex, anterior margin strongly convex, posterior margin slightly emarginate, humeral margins slightly longer than the lateral, disc distinctly wrinkled. Elytra moderately long, strongly overlapping and flaring apically.

Color: Vertex, pronotum, and scutellum dirty-yellowish, elytra milky-white. Vertex irrorate with light brown, apex light with a black spot either side, and usually two dark spots on posterior margin. Pronotum irrorate with light brown, disc darker. Scutellum irrorate with light brown, two dark spots on each margin, between which and apically there is a light spot. Elytra with an indistinct oblique light band before the middle where the dark brown irrorations are not as heavy as on the other portions which are tinged with fulvous. Face yellowish, irrorate with brown, darker above.

External genitalia: Female, last ventral segment twice as long as preceding, lateral angles rounded, with a broad median incision, widening basally, nearly or quite reaching the base, leaving two large lateral lobes, with prominent inner angles; pygofers moderately broad, exceeded by ovipositor, spiny apically. Male, valve broad, triangular, slightly longer than last ventral segment, obtuse apically; plates large and very broad basally, margins convex to about the apical third, tips parallel-margined and divergent, submarginal spines and marginal hairs not reaching the apex; pygofers completely hidden by the plates.

Distribution: Our only specimen of this species is from Lincoln county.

Hosts: Taken on grasses.

Phlepsius fulvidorsum (Fh.).

Jassus fulvidorsum Fh., Homop. N. Y. St. Cab., p. 62, 1851.
Phlepsius fulvidorsum Van D., Psyche, v, p. 390, 1890.
Phlepsius fulvidorsum Van D., Trans. Am. Ent. Soc., xix, p. 74, 1892.
Phlepsius fulvidorsum Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Phlepsius fulvidorsum Osb., 20th Rept. N. Y. St. Ent., p. 532, 1905.
Phlepsius fulvidorsum Osb., Me. Agr. Exp. Sta., Bul. 238, p. 142, 1915.
Phlepsius fulvidorsum DeL., Tenn. St. Bd. Ent., Bul. 17, p. 72, 1916.
Phlepsius fulvidorsum Van D., Cat. Hemip. N. A., p. 673, 1917.

Form: Females robust, males more slender. Length, 6 to 7 mm. Head as wide as pronotum; vertex two and one-half times as broad as long, one-half longer on middle than next the eye, with basal and preapical transverse depressions, the margin acute. Pronotum over twice as wide as long, lateral margins short, posterior margin emarginate. Elytra moderately long and fairly broad.

Color: Vertex, pronotum, and scutellum yellow, elytra darker. Vertex irrorate with light brown, frequently with five or six darker marginal spots. Pronotum irrorate with brown, disc darker. Scutellum pale, with two dark marginal spots. Elytra ivory-white to fulvous, coarsely and darkly irrorate. Face yellowish, heavily irrorate with dark brown.

External genitalia: Female, last ventral segment half longer than preceding, narrowed posteriorly, lateral angles not prominent, posterior margin sinuate on either side of the produced median half which is medially notched; pygofers semi-robust, barely exceeded by ovipositor, distal half somewhat spiny. Male, valve large, broad and triangular, obtusely angled apically; plates large and broad, completely hiding the pygofers, over twice as long as valve, margins strongly spined and convexly narrowed to the blunt apices.

Distribution: Taken in Pottawatomie county only.

Hosts: Recorded by Van Duzee on hemlock, spruce and pine. Professor Osborn gives birch, strawberry and blueberry as hosts. De Long records it from grasses.

Phlepsius nebulosus Van D.

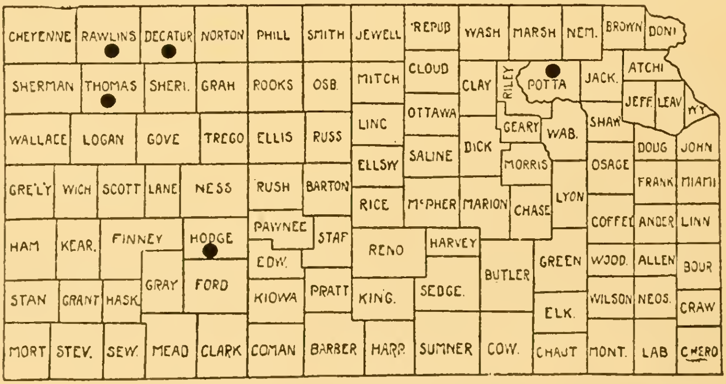
Phlepsius nebulosus Van D., Trans. Am. Ent. Soc., xix, p. 77, 1892.
Phlepsius nebulosus O. & B., Proc. Dav. Acad. Sci., vii, p. 100, pl. 6, fig. 4, 1898.
Phlepsius nebulosus Osb., 20th Rept. N. Y. St. Ent., p. 532, 1905.
***Phlepsius nebulosus* Van D., Cat. Hemip. N. A., p. 674, 1917.**

Form: Large, somewhat elongate. Length, 8 to 9 mm. Head slightly wider than pronotum; vertex one-fourth to one-half longer on middle than next the eye, two and one-half times as wide as long, disc depressed, margin acute, apex rounded to obtusely angulate. Pronotum transverse, over twice as wide as long, anterior margin broadly rounding, humeral margins a little longer than the lateral, posterior margin emarginate, disc distinctly wrinkled. Elytra moderately long, broad, slightly overlapping apically and slightly flaring.

Color: Vertex, pronotum, and scutellum yellowish, elytra whitish fulvous. Vertex and pronotum irrorate with light brown, latter darker on the disc. Scutellum pale with two dark marginal spots. Elytra rather evenly and closely inscribed with light to dark brown. Face yellowish, irrorate with brown.

External genitalia: Female, last ventral segment about three times as long as preceding, narrowed posteriorly to rounded, moderately produced, lateral angles, between which the posterior margin is emarginate and with a small median notch; pygofers moderately robust, exceeded by ovipositor, sparsely spined on distal half. Male, valve broad and triangular, nearly as long as last ventral segment, obtusely angulated apically; plates large, broad basally, three times as long as valve, margins with submarginal spines nearly to the obtuse diverging tips which greatly exceed the short and broad pygofers.

Distribution: Found chiefly in western Kansas as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
OTTAWA
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
GEARY
WAB.
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GRE'L'Y
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
COFFEE
ANDER
LINN
EDW.
GREEN
WOOD.
ALLEN
BOUR
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
BUTLER
WILSON
NEOS.
ELK.
CRAW
MORT
STEV.
SEW.
MEAD
CLARK
COMAN
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Osborn & Ball record this species from *Panicum virgatum.*

Phlepsius solidaginis (Walk.).

Acocephalus solidaginis Walk., List Homop., iii, p. 847, 1851.
Phlepsius humidus Van D., Trans. Am. Ent. Soc., xix, p. 76, 1892.
Phlepsius humidus Osb., 20th Rept. N. Y. St. Ent., p. 532, 1905.
Phlepsius solidaginis Van D., Can. Ent., xli, p. 384, 1909.
Phlepsius humidus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 143, 1915.
Phlepsius humidus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 74, 1916.
Phlepsius solidaginis Van D., Cat. Hemip. N. A., p. 674, 1917.

Form: Smaller than preceding species. Length, 7 to 8 mm. Head slightly wider than pronotum; vertex one-half longer on middle than next the eye, two and one-half times as wide as long, disc depressed, margin acute, obtusely angled apically. Pronotum transverse, twice as broad as long, humeral margins a little longer than the lateral, posterior margin emarginate, disc transversely wrinkled. Elytra moderately long and broad, slightly flaring apically.

Color: Vertex, pronotum, and scutellum yellowish, elytra fulvous. Vertex sparsely inscribed with light brown, pronotum with disc darker, scutellum with two dark marginal spots and light spots between. Elytra irrorate with dark brown, with whitish areas on base and at tip of claval area, there appearing to be two dark transverse bands behind these, and with a few dark spots on costal area. Face yellowish, irrorate with brown.

External genitalia: Female, last ventral segment twice as long as preceding, lateral angles large and obtuse, posterior margin deeply emarginate and sinuate on either side of a large median lobe which is notched and slightly exceeds the lateral angles; pygofers rather long and narrow, exceeded by ovipositor, distal half spiny. Male, valve broad and triangular, longer than last ventral segment, apex obtuse; plates together forming a triangle almost as wide as long, submarginally spined margins tapering regularly to subacute apices which greatly exceed the short pygofers, margins pilose, especially basally.

Distribution: Specimens of this species have been taken in Pottawatomie, Riley and Clark counties.

Hosts: Van Duzee gives *Sagittaria* and *Polygonum* as host plants. It is found on low ground.

Genus ACINOPTERUS Van D.

In the members of this genus the head is narrower than the pronotum and the vertex is nearly twice as long on the middle as next the eye. The pronotum is rather short, the lateral margins nearly as long as the humeral, and with the disc transversely wrinkled. The scutellum is finely but very distinctly granular. The moderately long elytra are very characteristically narrowed apically, the nervures strong.

The one species of the genus and one of its varieties have been found in the state.

Acinopterus acuminatus Van D.

(Pl. 14, figs. 3-4.)

Acinopterus acuminatus Van D., Psyche, vi, p. 308, 1892.

Acinopterus acuminatus G. & B., Hemip. Colo., p. 94, 1895.

Acinopterus acuminatus Van D., Bul. Buf. Soc. Nat. Sci., viii, No. 5, p. 69, 1907; ix, p. 225, 1909.

Acinopterus acuminatus Osb., Ohio Nat., ix, p. 466, 1909.

Acinopterus acuminatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 89, 1916.
Acinopterus acuminatus Van D., Cat. Hemip. N. A., p. 675, 1917.
Acinopterus acuminatus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 102, 1919.

Form: Rather robust, slightly tapering posteriorly. Length, 5 to 6.5 mm. Head distinctly narrower than pronotum, vertex nearly twice as long on middle as next the eye, about twice as wide as long. Pronotum over twice as wide as long, lateral margins long, posterior margin concave, disc transversely wrinkled. Scutellum large, entire surface granular. Elytra moderately long, tapering to acute apices, venation distinct.

Color: Vertex, pronotum, and scutellum greenish or olive-green, scutellum with two light longitudinal lines. Elytra shining dark brown, the nervures lighter, some of the cells, especially along the costa and on the clavus, subhyaline or greenish. Face olive-green, unmarked.

External genitalia: Female, last ventral segment twice as long as preceding, broadest basally, lateral margins broadly rounding to slightly produced posterior margin, which has an indistinct median notch; pygofers rather narrow, slightly exceeded by ovipositor, bearing a few scattered large spines. Male, valve covered by the large ventral segment; plates long and narrow, parallel-margined, obtuse apices somewhat divergent; spiny pygofers greatly exceeding plates.

Internal male genitalia: Styles fastened to a large round lobe at the base of the plates, margins of anterior half sinuately tapering, distal half stout and strongly curved, the large club-shaped and coarsely granular apices strongly diverging; connective small, heart-shaped, with the incision wide and the apex broadly rounding; œdagus very characteristic of the genus, broad basally, narrowing to the middle, distal half with two small ventral sword-like processes and a larger dorsal one, the latter fimbriate apically on the ventral margin.

Distribution: Specimens have been taken in Cherokee, Bourbon, and Miami counties. It is likely well distributed over the southeastern part of the state.

Hosts: De Long reports this species as abundant on grasses. Dr. Ball believes wild geranium to be the host plant.

Acinopterus acuminatus var. *viridis* Ball.

Acinopterus acuminatus var. viridis Ball, Can. Ent., xxxv, p. 231, 1903.

Form: That of typical *acuminatus*.

Color: Entire insect greenish, vertex with a yellowish tinge, ocelli reddish-brown. Nervures of elytra usually dark green, apical nervures sometimes bordered with fuscous.

Distribution: Our only specimens of this variety have come from Morton county.

Hosts: Probably the same as those of typical *acuminatus*.

Genus THAMNOTETTIX Zett.

The members of this genus are slender bodied, with long and narrow elytra, giving them a distinctly elongate appearance. The vertex is always wider than long, sometimes about parallel-margined, usually distinctly produced. The pronotum is rounded anteriorly with rather short and sharp lateral margins.

Nine of the eleven species keyed below have been taken in the state.

KEY TO SPECIES.

- A. Vertex short, nearly parallel-margined, apex with two large black spots.
  - B. Elytra without large yellow spot on clavus.
    - C. Reddish-brown large species, usually 6 mm. or over. *kennicotti.*
    - CC. Lighter and smaller species, less than 6 mm. in length. *brittoni.*
  - BB. Elytra with large yellow spot on clavus. *clitellarius.*
- AA. Vertex distinctly produced medially, without two large black apical spots.
  - B. Margin of vertex without definite dark markings.
    - C. Brownish species. *longulus.*
    - CC. Greenish species. *inornatus.*
  - BB. Margin of vertex with definite dark markings.
    - C. Disc of vertex marked with fulvous lines. *perspicillatus.*
    - CC. Disc of vertex unmarked (spots behind ocelli in *ciliatus*).
      - D. Margin of vertex with four black spots.
        - E. Size larger, over 4.5 mm. in length.
          - F. Vertex produced, about one-third wider than long, no spots on disc. *melanogaster.*
          - FF. Vertex shorter, nearly twice as broad as long, two black spots behind ocelli. *ciliatus.*
        - EE. Size smaller, less than 4.5 mm. in length.
          - F. Face not black.
            - G. Color dull yellow; female segment with distinct median tooth, male plates with long attenuate tips. *fitchii.*
            - GG. Brighter yellow in color; female segment without distinct median tooth, male plates not at all attenuate. *pallidula.*
          - FF. Face black, due to coalescing arcs. *nigrifrons.*

Thamnotettix kennicotti (Uhl.).

Jassus kennicotti Uhl., Proc. Am. Ent. Soc., ii, p. 161, 1863.
Thamnotettix kennicotti Uhl., Stand. Nat. Hist., p. 246, 1884.
Thamnotettix kennicotti Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Thamnotettix kennicotti Osb., 20th Rept. N. Y. St. Ent., p. 534, 1905.
Thamnotettix kennicotti Osb., Me. Agr. Exp. Sta., Bul. 238, p. 134, 1915.
Thamnotettix kennicotti DeL., Tenn. St. Bd. Ent., Bul. 17, p. 79, 1916.
Thamnotettix kennicotti Van D., Cat. Hemip. N. A., p. 676, 1917.

Form: Large and elongate. Length, 5.75 to 7 mm. Vertex short, over twice as broad as long, margins nearly parallel, sloping, and broadly rounding to front. Pronotum twice as long as vertex, lateral margins convex, widening posteriorly, humeral margins straight, distinctly angled with slightly emarginate posterior margin. Scutellum large. Elytra very long and narrow, greatly exceeding the abdomen.

Color: Rich reddish-brown; vertex yellowish, two large black apical spots between red ocelli, a fulvous transverse band on basal portion. Pronotum fulvous with a broad median band and sometimes a narrow yellow band on posterior margin. Elytra fulvous with lighter nervures and a distinct yellow stripe along costal suture. Yellow beneath.

External genitalia: Female, last ventral segment over twice as long as preceding, lateral margins rounding into rounded posterior margin, sometimes with a broad median keel; pygofers rather narrow, slightly exceeded by ovipositor, sparsely bristled. Male, last ventral segment as long as preceding; valve small, triangular, apex obtuse; plates broad on proximal half, then tapering to long attenuate tips; pygofers short, equalling or slightly exceeding plates, sparsely bristled.

Distribution: Taken in Cherokee and Pottawatomie counties.

Hosts: Doctor Ball gives this as a *Cratægus* species. De Long records sweeping specimens from oak.

Thamnotettix brittoni Osb.

Thamnotettix brittoni Osb., Proc. Dav. Acad. Sci., x, p. 166, 1907.
Thamnotettix brittoni Metc., Jl. Elisha Mitchell Sci. Soc., xxxi, p. 26, 1915.
Thamnotettix brittoni DeL., Tenn. St. Bd. Ent., Bul. 17, p. 79, 1916.
Thamnotettix brittoni Van D., Cat. Hemip. N. A., p. 677, 1917.

Form: Smaller and narrower than preceding species. Length, 5 to 6 mm. Vertex even less produced than in *kennicotti;* twice as broad as long, sloping, broadly rounding with front. Pronotum, scutellum and elytra as in *kennicotti.*

Color: Lighter, otherwise as in *kennicotti.*

External genitalia: Female, last ventral segment nearly as long as broad, lateral margins broadly rounding with somewhat produced posterior margin, keeled medially; pygofers rather narrow, slightly exceeded by ovipositor, slightly bristled. Male, valve broad and short, obtuse apically; plates broad basally, spiny margins concavely narrowing to long attenuate tips which nearly equal the bristly pygofers.

Distribution: Labette and Cherokee counties are the only ones in which this species has yet been taken.

Hosts: De Long reports taking this species from oak shrubs.

Thamnotettix clitellarius (Say).

(Pl. 14, figs. 5-6.)

Jassus clitellarius Say, Jl. Acad. Nat. Sci. Phila., vi, p. 309, 1831; Compl. Writ., ii. p. 384.

Bythoscopus clitellarius Fh., Homop. N. Y. St. Cab., p. 58, 1851.

Thamnotettix clitellarius Uhl., Stand. Nat. Hist., ii, p. 246, 1884.

Bythoscopus clitellarius Saund., Ins. Inj. Fruits, p. 188, 1886.

Thamnotettix clitellarius Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.

Thamnotettix clitellarius Osb., 20th Rept. N. Y. St. Ent., p. 534, 1905.

Thamnotettix clitellarius Osb., Me. Agr. Exp. Sta., Bul. 238, p. 134, 1915.

Thamnotettix clitellarius Van D., Cat. Hemip. N. A., p. 678, 1917.

Thamnotettix clitellarius Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 79, 1919.

Form: Length, 4.5 to 5.5 mm. Vertex short, over twice as broad as long, sloping, rounding to front. Pronotum twice as broad as long, strongly convex anteriorly, humeral margins longer than the lateral, posterior margin slightly emarginate. Scutellum large. Elytra characteristic of the genus.

Color: Vertex bright yellow except for two large black spots apically and the somewhat brown posterior margin. Pronotum brown on anterior third and along posterior margin, with a broad yellow band between. Scutellum brown. Elytra brown with costal area hyaline and a very characteristic oval yellow spot covering the greater part of the clavus. Yellow on face and beneath.

External genitalia: Female, last ventral segment long, lateral margins rounded with posterior margin which is deeply excavated on either side of a median tooth, which exceeds the rest of the margin and has its truncate apex slightly notched; pygofers long and narrow, basally constricted, slightly exceeded by ovipositor, sparsely spiny. Male, last ventral segment shorter than preceding; valve broad, triangular, margins slightly concave, apex obtuse; plates very long, exceeding bristly pygofers, margins slightly concave past middle, tips divergent preapically and apices curved. Pygofers with a large spine on apical margin.

Internal male genitalia: Styles large, with very large laterally rounded anterior process, a strong process to connective, after which the mesal margin is weakly chitinized for a short distance, then tapering sinuately to the obtuse apex which has a short but distinct lateral tooth, the entire apical portion quite roughened, so as to give the lateral margins the appearance of being serrate; connective stout, cleft at both ends, the arms at the anterior end rounded, those at the caudal end straight; œdagus with a weak dorsal basal projection which widens dorsally, the terminal portion long and deeply bicleft apically, forming two strap-like, curling, and acute appendages.

Distribution: This species has been taken in Douglas, Pottawatomie, and Riley counties.

Hosts: Found on many different plants.

Thamnotettix longulus G. & B.

(Pl. 14, fig. 7.)

Thamnotettix longula G. & B., Hemip. Colo., p. 97, 1895.
Thamnotettix longula O. & B., Proc. Ia. Acad. Sci., iv, p. 226, 1897.
Thamnotettix longula DeL., Tenn. St. Bd. Ent., Bul. 17, p. 82, 1916.
Thamnotettix longulus Van D., Cat. Hemip. N. A., p. 6880, 1917.

Form: Quite elongate. Length, 5 to 6 mm. Vertex more produced than in preceding species, being distinctly longer on middle than next the eye, twice as wide as long, sloping, and rounding obtusely with front. Pronotum long, scarcely twice as broad as long, strongly convex anteriorly, slightly emarginate posteriorly, lateral margins nearly as long as the humeral. Elytra very long and narrow.

Color: Nearly unicolorously fulvous, marked with brown. Vertex fulvous, white ocelli connected by light band, with median longitudinal line and two basal spots, darker. Pronotum irregularly mottled with darker spots anteriorly. Scutellum with basal angles and two spots on disc darker than the fulvous background. Elytra light fulvous, nervures lighter, some of them tending to be darker margined. Face marked with brown arcs.

External genitalia: Female, last ventral segment twice as long as the preceding, narrowed posteriorly, the posterior margin angularly emarginate one-third the length of the segment, slightly elevated; pygofers long and narrow, slightly exceeded by ovipositor, bearing many long bristles on posterior half. Male, last ventral segment two-thirds the length of the preceding, valve broad, triangular, obtuse at apex; plates broad basally and long, spiny margins tapering somewhat concavely to the acute tips which nearly equal the long-bristled pygofers.

Internal male genitalia: Styles very broad anteriorly due to large anterior processes and large processes to the connective, with a very definite lateral incision apically, leaving a large outwardly curving apical tooth which has its outer margin quite rough with small teeth; connective large, deeply bifid anteriorly, slightly so apically; œdagus broad basally, with a small basal and dorsal process, then gradually tapering till it divides into two long, apical, acutely-pointed processes.

Distribution: This species has been taken only in Cherokee and Douglas counties.

Hosts: DeLong reports this species as abundant on grasses.

Thamnotettix inornatus Van D.

Thamnotettix inornatus Van D., Trans. Am. Ent. Soc., xix, p. 303, 1892.
Thamnotettix inornatus Osb., 20th Rept. N. Y. St. Ent., p. 536, 1905.
Thamnotettix inornatus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 137, 1915.
Thamnotettix inornatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 81, 1916.
Thamnotettix inornatus Van D., Cat. Hemip. N. A., p. 684, 1917.

Form: Long and narrow. Length, 4.75 to 5.5 mm. Vertex distinctly produced, half longer on middle than next the eye, flattened, subacute apically. Pronotum long, not twice as broad as long, humeral margins a little longer than lateral, posterior margin slightly emarginate. Elytra very long and narrow.

Color: Nearly uniformly yellowish-green. Ocelli brown or black, a brown curved line from each to the apex. Elytra subhyaline, tips smoky, nervures bright yellow to brown. Face yellow, with brown arcs and with sutures of front black.

External genitalia: Female, last ventral segment half longer than preceding, broadly but not deeply emarginate medially, having distinct lateral angles; pygofers long and narrow, exceeded by ovipositor, bristly on posterior half. Male, valve broad, triangular, very obtuse apically; plates large and broad, margins armed with very long, white spines, convexly tapering to subacute apices; pygofers very characteristic, viewed laterally they are long and triangular, tapering to long and slender apex which terminates in a chitinous point, just exceeding plates, and bearing a tuft of white bristles just before the middle.

Distribution: This species has not yet been collected in Kansas, but undoubtedly occurs in the eastern part of the state.

Hosts: DeLong collected this species from *Elymus virginicus* and from other tall grasses.

Thamnotettix perspicillatus O. & B.

Thamnotettix perspicillatus O. & B., Proc. Ia. Acad. Sci., iv, p. 227, 1897.
Thamnotettix perspicillatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 81, 1916.
Thamnotettix perspicillatus Van D., Cat. Hemip. N. A., p. 680, 1917.

Form: Smaller than the preceding species. Length, 3.5 to 4 mm. Vertex about half wider than long, broadly rounding apically, disc sloping, rounding obtusely with front. Pronotum twice as broad as long, anterior margin strongly convex, lateral margins very short, humeral margins distinct, posterior margin slightly emarginate. Elytra typical of the genus though not as long as in the two preceding species.

Color: Grayish or brownish; vertex whitish, tinged with orange, with a wavy black line on each side from apex to ocelli, two brown median lines bending at right angles just before the middle, and two brown circles on the disc. Pronotum gray, with six white spots along the anterior margin, two small black spots back of each eye, and five faint longitudinal lines. Elytra subhyaline, marked with brown and black spots, nervures darkened apically. Front gray, with light median line and arcs.

External genitalia: Female, last ventral segment one-half longer laterally than preceding, posterior margin strongly and angularly produced; pygofers long and narrow, exceeded by ovipositor, bristly medially and apically. Male, last ventral segment as long as preceding; valve broad and short; plates broad basally, the spiny margins concavely narrowed to long attenuate tips which are slightly exceeded by the bristly pygofers.

Distribution: This species has not yet been reported from the state, but probably occurs here.

Hosts: Various grasses.

Thamnotettix melanogaster (Prov.).

Jassus melanogaster Prov., Nat. Can., iv, p. 378, 1872.
Thamnotettix melanogaster Prov., Pet. Faune Ent. Can., iii, p. 284, 1890.
Thamnotettix melanogaster Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Thamnotettix melanogaster Osb., 20th Rept. N. Y. St. Ent., p. 537, 1905.
Thamnotettix melanogaster Osb., Me. Agr. Exp. Sta., Bul. 238, p. 136, 1915.
Thamnotettix melanogaster DeL., Tenn. St. Bd. Ent., Bul. 17, p. 80, 1916.
Thamnotettix melanogaster Van D., Cat. Hemip. N. A., p. 682, 1917.

Form: Long and narrow. Length, 4.75 to 5.25 mm. Vertex distinctly produced, nearly half longer on middle than next the eye, one-third wider than long, disc flat or slightly concave. Pronotum nearly twice as wide as long, lateral margins distinct. Elytra very long.

Color: Brownish or yellowish-green, sometimes washed with orange. Vertex with four large black spots on margin, the two middle ones larger than the outer, disc unmarked. Scutellum with dark transverse impressed line. Face yellow. Abdomen black beneath.

External genitalia: Female, last ventral segment as long as preceding, narrowed posteriorly, posterior margin slightly emarginate; pygofers long, widest at the middle, exceeded by ovipositor, quite bristly on distal half. Male, valve large, broad and triangular, obtusely angled apically; plates very characteristic, broad basally, outer margin sinuately convex to acute, dark, chitinous apex, inner margin concave, so that apices are turned toward each other, a row of bristles running diagonally across before the middle, while on the outer margin and apically are long silky hairs; pygofers taper to long acute tips that exceed the plates.

Distribution: Reported from Riley county.

Hosts: Professor Osborn records this species as being common on coarse grasses and sedges on low ground.

Thamnotettix ciliatus Osb.

Thamnotettix ciliatus Osb., Proc. Ia. Acad. Sci., v, p. 244, 1898.
Thamnotettix ciliatus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 138, 1915.
Thamnotettix ciliatus Van D., Cat. Hemip. N. A., p. 683, 1917.

Form: Elongate like preceding species. Length, 4.5 to 5.5 mm. Vertex nearly twice as wide as long, about one-third longer on middle than next the eye, broadly rounded apically and obtusely rounding with front. Pronotum less than twice as wide as long, lateral margins short, humeral margins long. Elytra characteristic of the genus.

Color: Green or yellowish-green. Vertex yellow with four large black spots on margin, a spot, varying greatly in size, back of the ocelli and often two small parallel lines on the disc about half way between the base and the apex. Pronotum with disc greenish, margins frequently more yellow. Scutellum yellow. Elytra greenish, hyaline, apex sometimes smoky, nervures yellow or whitish. Face yellowish-green with antennal pits and sutures of front black, sometimes with black arcs. Nearly entirely black beneath.

External genitalia: Female, last ventral segment slightly longer than preceding, narrowed posteriorly, posterior margin slightly concave; pygofers long and narrow, slightly exceeded by ovipositor, spined on distal half. Male, valve large and broad, rounded posteriorly; plates broad and short, outer margin sinuately and convexly rounding to meet the divergent inner margins, the truncate apex with an acute inner angle, a few spines on the disc, margins and apices with long white silky hairs; pygofers long, exceeding plates, obtuse apically.

Distribution: Taken in Cherokee county.

Hosts: Grasses or sedges in low places.

Thamnotettix fitchii Van D.

Thamnotettix fitchii Van D., Ent. Am., vi, p. 133, 1890.
Thamnotettix fitchii Smith, N. J. Agr. Exp. Sta., Bul. K, p. 42, fig. 62, 1890.
Thamnotettix fitchii Osb., 20th Rept. N. Y. St. Ent., p. 535, 1905.
Thamnotettix fitchii Osb., Me. Agr. Exp. Sta., Bul. 238, p. 137, 1915.
Thamnotettix fitchii DeL., Tenn. St. Bd. Ent., Bul. 17, p. 79, 1916.
Thamnotettix fitchii Van D., Cat. Hemip. N. A., p. 683, 1917.
(*Cicadula 4-punctata* Fh. MS) in collections.

Form: Small but fairly robust for this genus. Length, 3.75 to 4.25 mm. Vertex distinctly wider than long, produced, obtusely angled. Pronotum with very short lateral margins, humeral margins long. Elytra long.

Color: Pale or dirty-yellow. Vertex with four black spots near margin, median longitudinal line and faint spots on either side, brown. Pronotum with five pale longitudinal lines. Scutellum yellow. Elytra smoky yellow with paler nervures. Face brownish, with pale median line and arcs, antennal pit and small spot below each ocellus, black.

External genitalia: Female, last ventral segment as long on lateral margins as preceding but with posterior margin broadly emarginate; valve broad and short, not at all angulate; plates broad basally, spiny margins concavely narrowed to long attenuate tips which exceed the short bristly pygofers.

Distribution: Specimens of this species have been taken in Douglas, Riley, and McPherson counties.

Hosts: This species occurs on grasses in low and moist places.

Thamnotettix pallidulus Osb.

Thamnotettix pallidulus Osb., Proc. Ia. Acad. Sci., v, p. 245, 1898.
Thamnotettix pallidulus Van D., Cat. Hemip. N. A., p. 684, 1917.

Form: Very much like *fitchii.* Length, 3.75 to 4.25 mm. Vertex nearly one-third wider than long, one-third longer on middle than next the eye, roundingly angulate apically. Pronotum strongly convex anteriorly, lateral margins very short, humeral margins long, posterior margin practically straight. Elytra characteristic of the genus.

Color: More yellow than *fitchii.* Vertex, pronotum, and scutellum bright yellow. Vertex with four black marginal spots, ocelli black. Elytra a dirty-yellow, nervures yellowish or whitish, more distinct basally. Face with brownish arcs and sometimes a black spot below ocelli.

External genitalia: Female, last ventral segment about length of the preceding, composed of two membranes, the outer strongly narrowed posteriorly, exposing the sides and lateral angles of the inner, posterior margin of the outer nearly truncate, sometimes slightly emarginate; pygofers short and stout, nearly equalling ovipositor, distal half quite bristly. Male, valve broad and short, broadly rounded posteriorly; plates broad basally, spiny margins slightly convex, tips acute, exceeded by the strongly bristled pygofers which, viewed laterally, are triangular, drawn out into long, attenuate, and acute apices.

Distribution: Taken in Cherokee and Douglas counties.

Hosts: Probably a grass feeder.

Thamnotettix nigrifrons (Forbes).

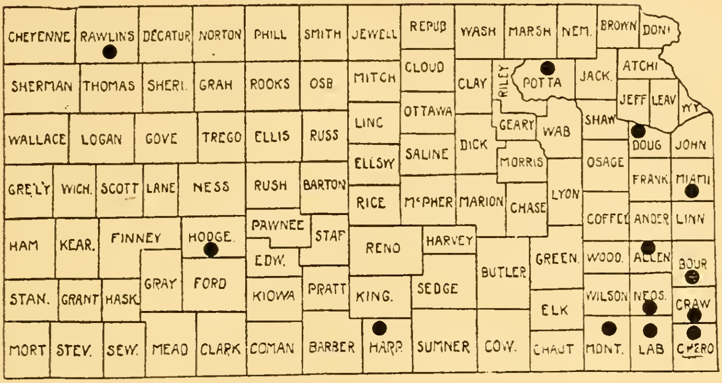
Cicadula nigrifrons Forbes, 14th Rept. Ill. St. Ent., p. 67, pl. 5, fig. 3, 1864.
Thamnotettix perpunctata Van D., Bul. Buf. Soc. Nat. Sci., v, pp. 200, 212, 1894.
Deltocephalus nigrifrons O. & B., Proc. Ia. Acad. Sci., iv, p. 218, 1897 (part).
Thamnotettix perpunctata Bak., Psyche, viii, p. 116, 1897.
Deltocephalus nigrifrons Osb., U. S. Dept. Agr., Bur. Ent., Bul. 108, p. 77, fig. 14, 1912 (part).
Thamnotettix nigrifrons Van D., Cat. Hemip. N. A., p. 684, 1917.
Thamnotettix nigrifrons Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 81, 1919.

Form: Smaller than preceding species. Length, 3.25 to 4 mm. Vertex wider than long, one-third longer at middle than next the eye, roundingly obtuse apically. Pronotum nearly one-half longer than the vertex, not twice as wide as long, anterior margin strongly convex, lateral margins very short, humeral margins long, posterior margin very slightly emarginate. Scutellum broad. Elytra long and narrow, strongly overlapping apically, only one cross nervure between the sectors.

Color: Yellowish-green; vertex yellowish, with four large black marginal spots, ocelli black, median longitudinal line brown. Pronotum with whitish or yellowish spots along anterior margins sometimes with black showing through the disc. Scutellum yellowish or whitish, with basal angles and apex rather more strongly yellow, and with black transverse impressed line. Elytra subhyaline, rather smoky apically, nervures whitish or yellowish. Face yellow, strongly marked with black coalescing arcs. Beneath black marked with yellow.

External genitalia: Female, last ventral segment as long as preceding, composed of two membranes, the outer strongly narrowed posteriorly, exposing lateral angles of the shorter inner membrane, posterior margin of outer membrane truncate or elevated and seemingly broadly emarginate; pygofers long, slightly exceeded by ovipositor, bristly, especially on distal half. Male, last ventral segment as long as preceding; valve broad and short, posteriorly broadly rounded; plates broad and triangular, spiny margins rather slightly concave to acute apices which are slightly exceeded by the bristly and acute pygofers.

Distribution: Very common in the eastern part of the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF
LEAV
WY
OTTAWA
LINC
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
GEARY
WAB
SHAW
DOUG
JOHN
SALINE
DICK
ELLSW
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
FRANK
MIAMI
RICE
McPHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
PAWNEE
HAM
KEAR.
FINNEY
HODGE.
STAF
RENO
HARVEY
EDW.
GREEN.
WOOD.
ALLEN
BOUR
BUTLER
GRAY
FORD
STAN.
GRANT
HASK
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS.
CRAW
ELK
MORT
STEV.
SEW.
MEAD
CLARK
COMAN
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Doctor Forbes when describing this species reported it as injurious to oats, wheat, and corn. Professor Osborn says it shows a distinct preference for annual grasses such as fox-tail and the panic grasses from which it migrates into the cultivated crops on the withering of the former. He also says it is very common on bluegrass and timothy.

Genus CHLOROTETTIX Van D.

The members of this genus are mostly rather large species of a uniform green color, often fading to a yellowish-green in preserved specimens. A few species, however, are small and some are marked with spots or bands on the head, pronotum, or scutellum. The vertex is broad, either rounded or distinctly bluntly angled apically. The sides of the pronotum are moderately long. The elytra are long and thin, subhyaline, with a distinct appendix, the nervures indistinct.

All the members of the genus are grass feeders and so no mention will be made of the specific hosts of each species.

The seven species keyed below have all been recorded from Kansas.

KEY TO SPECIES.*

A. Vertex with anterior margin rounded, not distinctly angulate.
  B. General color brownish, elytra appearing striped. *necopinus.*

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* Adapted from key by DeLong, Ohio St. Univ. Bul., xxiii, No. 15, p. 4, 1919.

BB. General color greenish.
C. Female ventral segment with broad spatulate process; male plates long, gradually tapering. *spatulatus.*
CC. Female ventral segment notched but without spatulate process.
D. Size large, 7.5 mm. long; female segment uniformly, concavely and deeply notched, male plates narrowed at half their length then produced. *unicolor.*
DD. Size smaller, not over 7 mm. long; female segment with sides of notch each bearing a lateral tooth, male plates very short, broadly rounded. *viridius.*
AA. Vertex with anterior margin distinctly but bluntly angulate.
B. Size smaller, not exceeding 6.5 mm. in length.
C. Vertex distinctly angled, almost twice as long at middle as next the eyes; female segment broadly and triangularly notched half way to base. *vividus.*
CC. Vertex more bluntly angled, not over one-half longer at middle than next the eyes; female segment narrowly incised nearly to base. *galbanatus.*
BB. Size larger, 7 mm. or longer; female segment broadly but shallowly emarginate, a minute notch and brown spot at center. *tunicatus.*

Chlorotettix necopinus Van D.

Chlorotettix necopinus Van D., Can. Ent., xxv, p. 282, 1893.
Chlorotettix necopinus Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 228, 1909.
Chlorotettix necopinus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 84, 1916.
Chlorotettix necopinus Van D., Cat. Hemip. N. A., p. 688, 1917.
Chlorotettix necopinus Fent., Ohio Jl. Sci., xviii, p. 185, 1918.
Chlorotettix necopinus DeL., Ohio St. Univ. Bul., xxiii, p. 8, 1919.
Chlorotettix necopinus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 83, 1919.

Form: Length, 7 mm. Vertex slightly longer on middle than next the eye, over twice as wide as long. Pronotum twice as wide as long, anterior margin strongly convex, posterior margin distinctly concave, short lateral margins rounding into the humeral margins, disc transversely wrinkled. Elytra long, greatly exceeding abdomen.

Color: General color brownish. Vertex, pronotum, and scutellum with a greenish tinge. Vertex with a broad transverse black band on the disc. Pronotum marked with brown, the median line and anterior margin paler. Scutellum with triangular spots in basal angles, a median line with a small spot on either side, brown. Elytra brown with the nervures lighter, giving them a striped appearance. Face with ten pale arcs and two brown spots at base of clypeus.

External genitalia: Female, last ventral segment over twice as long as the preceding, strongly narrowed posteriorly, lateral angles acute, between them the posterior margin being broadly and deeply cleft, the cleft with a small blunt tooth; pygofers rather broad, nearly equalling ovipositor, spined on distal half. Male, valve about twice as long as preceding segment, broad, margins concave on either side of the rounded apex;

plates broad basally, suddenly constricted beyond middle and then produced to the slightly divergent tips, exceeded by the blunt and spiny pygofers.

Distribution: Specimens of this species have been taken only from Cherokee county.

Chlorotettix spatulatus O. & B.

(Pl. 14, fig. 8.)

Chlorotettix spatulatus O. & B., Proc. Ia. Acad. Sci., iv, p. 225, pl. 26, fig. 4, 1897.
Chlorotettix spatulatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 86, 1916.
Chlorotettix spatulatus Van D., Cat. Hemip. N. A., p. 686, 1917.
Chlorotettix spatulatus DeL., Ohio St. Univ. Bul., xxiii, p. 12, 1919.
Chlorotettix spatulatus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 86, 1919.

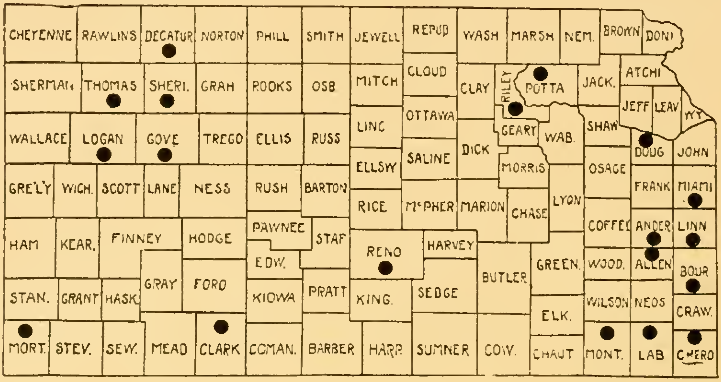
Form: Length, 6 to 7 mm. Vertex slightly longer on the middle than next the eye, over twice as wide as long, broadly rounding with front. Pronotum twice as wide as long, posterior margin distinctly emarginate, short lateral margins rounding with humeral margins, disc transversely wrinkled. Elytra rather broad, greatly exceeding abdomen, venation weak.

Color: Uniformly greenish or yellowish-green.

External genitalia: Female, last ventral segment one-half longer than the preceding, posterior margin broadly notched nearly three-fourths of the distance to the base, the notch with a median spatulate process over one-half the length of the notch; pygofers long and narrow, exceeding the ovipositor, sparsely spined. Male, valve broad, longer than last ventral segment, obtusely rounded apically; plates about three times as long as the valve, broad basally, convex, spiny margins tapering to the subacute apices, which are exceeded by the bristly pygofers.

Internal male genitalia: Styles with large anterior curving process and very broad at point of attachment to connective, then tapering rather gradually till terminal fourth, when they are suddenly narrowed to long and slender apical portion; connective Y-shaped, the stem also somewhat divided apically; œdagus long and curving, dividing into two branches apically, which in turn divide again, there being thus four slender curving and acutely-tipped terminal processes, the inner pair of which are longer than the outer.

Distribution: This is our commonest member of the genus. It is found all over the state, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG
JOHN
SALINE
DICK
MORRIS
OSAGE
ELLSW
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK.
MIAMI
PAWNEE
COFFEE
ANDER
LINN
HAM
KEAR.
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HODGE
STAF
RENO
HARVEY
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GREEN.
WOOD.
ALLEN
BOUR
BUTLER
GRAY
FORD
STAN.
GRANT
HASK
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS
CRAW.
ELK.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Chlorotettix unicolor (Fh.).

Bythoscopus unicolor Fh., Homop. N. Y. St. Cab., p. 58, 1851.
Jassus unicolor Uhl., Bul. U. S. Geol. Geog. Surv., iv, p. 511, 1878.
Grypotes unicolor Uhl., Stand. Nat. Hist., ii, p. 246, 1884.
Thamnotettix unicolor Harr., Ottawa Nat., vi, p. 32, 1892.
Athysanus unicolor Southw., Science, xix, p. 288, 1892.
Chlorotettix unicolor Van D., Psyche, vi, pp. 306, 308, 1892.
Chlorotettix vanduzei Bak., Can. Ent., xxx, p. 219, 1898.
Chlorotettix unicolor Osb., 20th Rept. N. Y. St. Ent., p. 538, 1905.
Chlorotettix unicolor Osb., Me. Agr. Exp. Sta., Bul. 238, p. 144, 1915; Bul. 248, p. 76, 1916.
Chlorotettix unicolor Van D., Cat. Hemip. N. A., p. 685, 1917.
Chlorotettix unicolor Fent., Ohio Jl. Sci., xviii, p. 185, 1918.
Chlorotettix unicolor DeL., Ohio Jl. Sci., xviii, p. 227, 1918.
Chlorotettix unicolor DeL., Ohio St. Univ. Bul., xxiii, p. 13, 1919.

Form: One of our largest species. Length, 6.75 to 8 mm. Vertex slightly longer at middle than next the eye, two and one-half times as broad as long, broadly rounding with front. Pronotum short, over twice as broad as long, anterior margin broadly but not strongly convex, short lateral margins rounding with the humeral margins, posterior margin distinctly emarginate. Elytra long, greatly exceeding the abdomen.

Color: Almost uniformly pale green or yellowish-green. Elytra hyaline, the nervures often dark green in color.

External genitalia: Female, last ventral segment nearly twice as long as the preceding, with a fairly broad median notch the apex of which is surrounded by a brown spot, the posterior margin sinuate on either side of the notch; pygofers rather long, spiny, slightly exceeding the ovipositor. Male, valve broad, posterior margin somewhat sinuate on either side of the obtuse, nearly truncate apex; plates broad basally, submarginally spined margins concave on apical half, tips produced, subacute, slightly diverging, greatly exceeded by the pygofers.

Distribution: Van Duzee reports this species from Kansas. The specimens in the Snow collection are from Colorado, Nebraska, and Maine.

Chlorotettix viridius Van D.

Chlorotettix viridius Van D., Psyche, vi, p. 309, 1892.
Athysanus viridius Southw., Science, xix, p. 288, 1892.
Chlorotettix viridius Weed, Can. Ent., xxiv, p. 278, 1892.
Chlorotettix viridius Osb., 20th Rept. N. Y. St. Ent., p. 538, 1905.
Chlorotettix viridius DeL., Tenn. St. Bd. Ent., Bul. 17, p. 86, 1916.
Chlorotettix viridius Van D., Cat. Hemip. N. A., p. 687, 1917.
Chlorotettix viridius DeL., Ohio St. Univ. Bul., xxiii, p. 15, 1919.
Chlorotettix viridius Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 84, 1919.

Form: Like *unicolor* but smaller. Length, 6 to 7 mm. Vertex slightly longer at middle than next the eye, over twice as wide as long, broadly rounding with front. Pronotum scarcely twice as wide as long, anterior margin broadly convex, posterior margin slightly concave. Elytra greatly exceeding abdomen.

Color: Bright or apple-green. Vertex and anterior portion of pronotum yellowish. Elytra hyaline, nervures greenish.

External genitalia: Female, last ventral segment with acute lateral angles between which is a broad incision reaching nearly to the base, the margins of the incision each with an obtuse blackish tooth near the middle; the long sparsely spined pygofers slightly exceeding the ovipositor. Male, valve broad, slightly shorter than last ventral segment, broadly rounded posteriorly; plates short, produced beyond the valve about the length of the latter, together nearly semicircular, margins spiny, apices somewhat divergent; thin pygofers greatly exceeding the plates.

Distribution: Specimens of this species have thus far been found in Labette, Bourbon, and Cherokee counties. Thus it seems to be confined to the southeastern part of the state.

Chlorotettix vividus Crmb.

Chlorotettix vividus Crmb., Ann. Ent. Soc. Am., viii, p. 197, 1915.
Chlorotettix vividus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 88, 1916.
Chlorotettix vividus Van D., Cat. Hemip. N. A., p. 687, 1917.
Chlorotettix vividus DeL., Ohio St. Univ. Bul., xxiii, p. 19, 1919.
Chlorotettix vividus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 84, 1919.

Form: The smallest species of the genus in Kansas. Length, 5.5 to 6 mm. Vertex nearly twice as long at middle as next the eye, one and one-half times as wide as long, convex. Pronotum scarcely twice as wide as long, anterior margin strongly convex, lateral margins short, posterior margin slightly emarginate. Elytra strongly exceeding abdomen.

Color: Brownish-green; elytra more distinctly green than vertex, pronotum, and scutellum.

External genitalia: Female, last ventral segment twice the length of the preceding, lateral angles obtuse, posterior margin broadly and triangularly notched nearly half way to the base; pygofers narrow, very slightly exceeded by the ovipositor, spiny on distal half. Male, valve broad, longer than last ventral segment, margins sinuate on either side of the slightly notched apex; plates long, spiny margins narrowing to the attenuately produced apices which are equalled by the bristly pygofers.

Distribution: The only Kansas records for this species are from Douglas and Cherokee counties.

Chlorotettix galbanatus Van D.

Chlorotettix galbanatus Van D., Psyche, vi, p. 310, 1892.
Athysanus galbanatus Southw., Science, xix, p. 288, 1892.
Chlorotettix unicolor Bak., Can. Ent., xxx, p. 219, 1898.
Chlorotettix galbanatus Osb., 20th Rept. N. Y. St. Ent., p. 538, 1905.
Chlorotettix galbanatus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 143, 1915.
Chlorotettix galbanatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 88, 1916.
Chlorotettix galbanatus Van D., Cat. Hemip. N. A., p. 687, 1917.
Chlorotettix galbanatus Fent., Ohio Jl. Sci., xviii, p. 185, 1918.
Chlorotettix galbanatus DeL., Ohio St. Univ. Bul., xxiii, p. 22, 1919.
Chlorotettix galbanatus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 83, 1919.

Form: A little larger than *vividus*. Length, 6 to 6.5 mm. Vertex quite obtusely angled, one-half longer on middle than next the eye, over twice as wide as long. Pronotum long, less than twice as wide as long, anterior margin strongly convex, lateral margins short, posterior margin slightly emarginate. Elytra greatly exceeding the abdomen.

Color: Uniformly pale yellowish-green. Elytra hyaline, slightly iridescent.

External genitalia: Female, last ventral segment long, divided into two large lateral lobes by a rather broad incision reaching nearly to the base; pygofers slightly exceeded by ovipositor, sparsely bristly, especially apically. Male, valve large, broad, longer than last ventral segment, very obtusely angled apically; plates large, broad, hairy margins rounding to the obtuse apices which are slightly exceeded by the pygofers.

Distribution: So far this species has been taken only in Douglas and Wyandotte counties.

Chlorotettix tunicatus Ball.

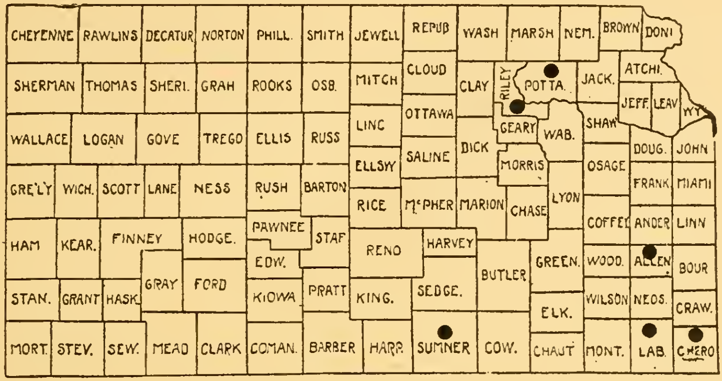
Chlorotettix tunicatus Ball, Can. Ent., xxxii, p. 340, 1900.
Chlorotettix tunicatus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 87, 1916.
Chlorotettix tunicatus Van D., Cat. Hemip. N. A., p. 688, 1917.
Chlorotettix tunicatus DeL., Ohio St. Univ. Bul., xxiii, p. 25, 1919.
Chlorotettix tunicatus Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 83, 1919.

Form: Larger than *galbanatus*. Length, 7 mm. Vertex one-half longer at middle than next the eye, twice as wide as long, broadly rounding with front. Pronotum long, less than twice as wide as long, anterior margin broadly convex, posterior margin slightly concave. Elytra greatly exceeding the abdomen.

Color: Uniformly pale yellowish-green. Elytra subhyaline.

External genitalia: Female, last ventral segment one-half longer than the preceding, lateral angles broadly rounding, posterior margin roundingly emarginate nearly one-half the distance to the base, brownish medially; pygofers slightly exceeded by the ovipositor, distal half spiny. Male, valve broad, slightly longer than the last ventral segment, margins concave on either side of the obtusely angled apex; plates broad basally, convex, spiny margins rounding to the obtuse apices.

Distribution: Fairly common in eastern Kansas as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL.
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
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RILEY
POTTA.
JACK.
ATCHI.
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG.
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GRE'LY
WICH.
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RUSH
BARTON
RICE
McPHER
MARION
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PAWNEE
STAF
RENO
HARVEY
COFFEE
ANDER
LINN
EDW.
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GRANT
HASK
GRAY
FORD
KIOWA
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SEDGE.
BUTLER
WILSON
NEOS.
CRAW.
ELK.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB.
CHERO

Genus JASSUS Fabr.

In the members of this genus the head is distinctly narrower than the pronotum, and seems to be set back on the latter. The vertex is quadrate, not at all produced in front. The front has distinct transverse striæ. The pronotum is very short, about the length of the vertex, the lateral portions well covered by the head, with short lateral margins, long humeral margins, and the posterior margin slightly concave. The scutellum is very large, wider than long. The elytra are rather short and broad, broadly rounded apically, the nervures strong.

A single species of the genus occurs in Kansas.

Jassus olitorius Say.

(Pl. 15, figs. 1-2.)

Jassus olitorius Say, Jl. Acad. Nat. Sci. Phila., vi, p. 310, 1831; Compl. Writ., ii, p. 385.
Jassus subbifasciatus Say, Jl. Acad. Nat. Sci. Phila., vi, p. 310, 1831.
Cœlidia olitorius Fh., Homop. N. Y. St. Cab., p. 58, 1851.
Jassus fuscipennis Spangb., Of. Vet. Akad. Forh., xxxv, No. 8, p. 26, 1878.
Cœlidia semifasciata Uhl., Stand. Nat. Hist., ii, p. 245, fig. 311, 1884.
Jassus olitorius Van D., Psyche, v, p. 389, 1890.
Idiocerus subbifasciatus Prov., Pet. Faune Ent. Can., iii, p. 292, 1890.
Pediopsis subbifasciatus Harr., Ottawa Nat., vi, p. 31, 1892.
Jassus olitorius Osb., 20th Rept. N. Y. St. Ent., p. 539, 1905.
Jassus olitorius Osb., Me. Agr. Exp. Sta., Bul. 238, p. 145, 1915.
Jassus olitorius DeL., Tenn. St. Bd. Ent., Bul. 17, p. 91, 1916.
Jassus olitorius Van D., Cat. Hemip. N. A., p. 689, 1917.
Jassus olitorius Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 104, 1919.

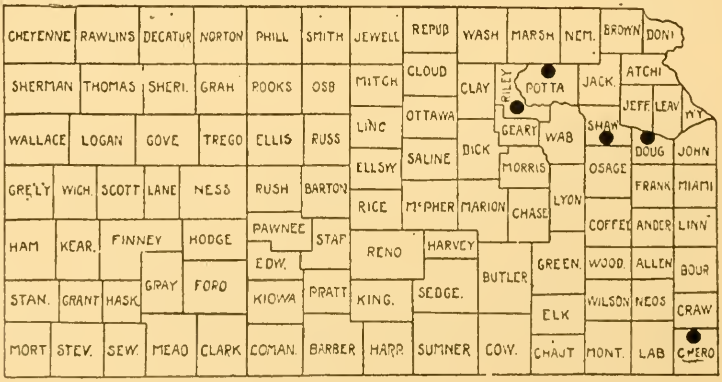
Form: Length, 6 to 8 mm. Head much narrower than the pronotum. Vertex about as wide as long, rounded anteriorly. Pronotum about as long as the vertex, three times as wide as long, widest at lateral angles, lateral margins short, humeral margins long, posterior margin slightly emarginate. Scutellum very large. Elytra rather short and broad, rounded apically, venation distinct.

Color: Varying from light to dark brown. Vertex dirty-yellow, ocelli, a median longitudinal line, and often a pair of spots on disc, brownish. Pronotum brown, darker posteriorly in the male. Scutellum brown, sometimes with basal angles and two spots on disc black. Elytra brown, nervures usually darker, females with two light transverse bands. Face the color of the vertex, the front usually darker. Males lack the light bands on the elytra and are uniformly darker.

External genitalia: Female, last ventral segment laterally twice as long as the preceding, keeled, and with posterior margin strongly produced medially; pygofers short, broad basally but strongly narrowed apically, much exceeded by the long stout ovipositor. Male, valve hidden by the short last ventral segment; plates very long and narrow, becoming vertical and spiny on their apical half, their apices exceeding the ventrally shortened but dorsally produced pygofers.

Internal male genitalia: Styles long and slender, curving, enlarged distally, apices obtuse, proximal end with two chitinous processes, the ventral one the larger, the whole end spreading out into a thin chitinous fan-shaped base; connective of two pieces, the first is V-shaped and connects the styles, the second is columnar, deeply cleft at the upper end for the reception of the apex of the V-shaped portion and connecting with the œdagus at the lower end, and the whole connective projecting ventrad, instead of dorsad, as is usually the case; œdagus widened a short distance from its base for the attachment of a long dorsal process which runs up for the attachment of the membrane from the anal tube, then continuing as a long narrow curving process which is suddenly bent and narrowed preapically, and finally ending in a delicate spine-like tip.

Distribution: This species occurs in eastern Kansas as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
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SMITH
JEWELL
REPUB
WASH
MARSH
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SHERMAN
THOMAS
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GRAH
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LOGAN
GOVE
TREGO
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GEARY
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SHAW
DOUG
JOHN
SALINE
DICK
ELLSW
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
PAWNEE
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
STAF
RENO
HARVEY
EDW.
BUTLER
GREEN.
WOOD.
ALLEN
BOUR
GRAY
FORD
PRATT
STAN.
GRANT
HASK.
KIOWA
KING.
SEDGE.
WILSON
NEOS
CRAW
ELK
MORT
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: This seems to be a very general feeder. The adults are especially common in Douglas county on *Ambrosia trifida.* The nymphs have frequently been taken on oak.

Genus NEOCŒLIDIA G. & B.

The members of this genus are generally short and robust though some are distinctly elongate. The head is narrower than the pronotum and is obtusely conical. The pronotum is very short and broad, the anterior and posterior margins being nearly parallel. The elytra are short and broad, with usually four apical cells, though sometimes there are but three. The valve of the male is very characteristic being very large and produced posteriorly so as to completely cover the rest of the genitalia.

One of the two species keyed below has been taken in the state. The other one probably occurs here too.

KEY TO SPECIES.

A. Color yellowish-green, apex of vertex without black spot. *tumidifrons.*
AA. Color whitish, apex of vertex with black spot. *candida*

Neocœlidia tumidifrons G. & B.

Neocœlidia tumidifrons G. & B., Hemip. Colo., p. 104, 1895.
Neocœlidia tumidifrons O. & B., Proc. Ia. Acad. Sci., iv, p. 183, 1897.
Neocœlidia tumidifrons Osb., Me. Agr. Exp. Sta., Bul. 238, p. 145, 1915.
Neocœlidia tumidifrons DeL., Tenn. St. Bd. Ent., Bul. 17, p. 91, 1916.
Neocœlidia tumidifrons Van D., Cat. Hemip. N. A., p. 690, 1917.
Neocœlidia tumidifrons Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 103, 1919.

Form: Short and very robust. Length, 4 to 5 mm. Head narrower than the pronotum. Vertex one-half longer at the middle than next the eye, a little broader than long, tumid and obtusely conical. Pronotum shorter than the vertex, over three times as wide as long, lateral margins convex, humeral margins long, anterior and posterior margins about parallel, transversely rugose. Elytra short and broad, barely reaching to tip of abdomen.

Color: Uniformly yellowish or yellowish-green, the vertex and face sometimes washed with orange. Elytra subhyaline, the nervures indistinct.

External genitalia: Female, last ventral segment large, posterior margin slightly sinuate on either side of a small median notch, lateral angles slightly produced and rounded; pygofers large, slightly exceeded by ovipositor and sparsely spined. Male with the large triangular valve characteristic of the genus.

Distribution: Specimens of this species have been taken in Cherokee and Douglas counties.

Neocœlidia candida Ball.

Neocœlidia candida Ball, Ent. News, xx, p. 166, 1909.
Neocœlidia candida Van D., Trans. San Diego Soc. Nat. Hist., ii, p. 55, 1914.
Neocœlidia candida Van D., Cat. Hemip. N. A., p. 690, 1917.

Form: Stout and robust. Length, 4.25 to 4.5 mm. Vertex a little wider than long, bluntly oval apically, disc convex, rounding to the tumid front. Pronotum shorter than the vertex, over three times as wide as long, anterior and posterior margins about parallel, humeral margins long and rounding with the shorter lateral margins. Elytra short but exceeding abdomen, venation distinct.

Color: Whitish, sometimes tinged with pale green. Vertex with black apical spot, ocelli and sometimes a pair of spots on disc, brown. Pronotum and scutellum unmarked except for brownish impressed line of the latter. Elytra milky-white, nervures pale brown, apical cells sometimes brownish. Face pale, unmarked.

External genitalia: Female, last ventral segment three times as long as the preceding, curved around the pygofers, posterior margin slightly medially produced; pygofers broad, nearly equalling the ovipositor, sparsely spined. Male, valve as broad basally as last ventral segment, longer than broad, apex acute, nearly equalling pygofers, with two round black spots on disc.

Distribution: Not yet reported from Kansas but should occur in the western portion of the state.

Hosts: Doctor Ball informs me that *Atriplex canescens* is the host plant of this species.

Genus CICADULA Zett.

In general the members of this genus are rather small and elongate. The vertex is longer on the middle than next the eye, but not strongly produced. The pronotum is short, the anterior margin more or less convex, the posterior margin slightly concave. The elytra are long, exceeding the abdomen, overlapping apically, with a distinct appendix, and with the inner sector not forked, there being only two anteapical cells. The wings have three apical cells, thus differing from the wings of the two following genera where there are but two apical cells.

Four species and a variety of this genus have been taken in Kansas.

KEY TO SPECIES.

A. Species large and robust, 4.5 mm. or more in length. *punctifrons.*
AA. Species smaller, elongate, 4 mm. or less in length.
  B. Vertex with four black spots. *variata.*

AA. Species smaller—*concluded.*
- BB. Vertex with six black spots.
  - C. Four of the black spots in a row on the margin of vertex; basal angles of scutellum black. *lepida.*
  - CC. Black spots of vertex in two rows of three each, the two anterior pairs usually forming lines; basal angles of scutellum unmarked. *sexnotata.*

Cicadula punctifrons (Fall.).

Cicada punctifrons Fall., Hemip. Suec., Cicad., p. 42, 1826.
Thamnotettix punctifrons Boh., Kong. Vet. Akad. Handl. for 1847, p. 33.
Jassus punctifrons Flor., Rhyn. Livl., p. 328, 1861.
Limotettix punctifrons Sahlb., Cicad., p. 244, 1871.
Cicadula punctifrons Fieb., Revue d'Ent., iv, pp. 50, 58, 1885.
Cicadula punctifrons Van D., Psyche, vi, p. 305, 1892.
Cicadula punctifrons Mel., Cicad. Mitt. Eur., p. 34, pl. 11, figs. 1-4, 1896.
Cicadula punctifrons Edw., Hemip. Homop. Brit. Isds., p. 185, pl. 21, fig. 3, 1896.
Cicadula punctifrons Osb., 20th Rept. N. Y. St. Ent., p. 540, 1905.
Cicadula punctifrons Van D., Cat. Hemip. N. A., p. 692, 1917.

Form: A robust species. Length, 4 to 5 mm. Vertex nearly parallel-margined, very slightly longer on the middle than next the eye, broadly rounding with front. Pronotum twice as wide as long, anterior margin broadly convex, posterior margin very slightly emarginate, lateral margins very short, humeral margins long. Elytra long and narrow, greatly exceeding the abdomen, strongly overlapping apically, appendix distinct.

Color: Vertex, pronotum, and scutellum dirty-yellow. Vertex with two large round black spots anteriorly. Elytra milky-white, washed with yellow.

External genitalia: Female, last ventral segment about as long as preceding, posterior margin slightly produced medially; pygofers large, widest at the middle, equalling or slightly exceeding the ovipositor. Male, valve broad, rounded posteriorly, about three-fourths as long as last ventral segment; plates broad basally, about twice as long as valve, spineless margins narrowing somewhat concavely to the subacute somewhat divergent apices; pygofers broad, bristly, slightly exceeding plates.

Distribution: Hamilton county has furnished the only specimens of this species yet taken in the state.

Hosts: Willow.

Cicadula punctifrons var. *repleta* Fieb.

(Pl. 15, figs. 3-4.)

Cicadula punctifrons var. *repleta* Fieb., Revue d'Ent., iv, p. 49, 1885.
Macrosteles punctifrons var. *repleta* Horv., Ann. Mus. Natl. Hung., vi, p. 566, 1908.
Cicadula punctifrons var. *americana* Van D., Can. Ent., xxiii, p. 169, 1891.
Cicadula punctifrons var. *americana* Osb., 20th Rept. N. Y. St. Ent., p. 540, 1905.
Cicadula punctifrons var. *americana* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 93, 1916.
Cicadula punctifrons var. *repleta* Van D., Cat. Hemip. N. A., p. 693, 1917.

Form: Like the preceding but usually larger. Length, 5 to 6 mm. The lateral margins of pronotum relatively longer than in typical *punctifrons.*

Color: Ground color like the preceding, variously marked with brown or black. In lightly marked specimens there are faint brown stripes on the elytra and two brownish spots on the margin of the apex between the two usual large black spots. Moderately colored specimens show five dark stripes on the elytra, two on the clavus and three on the corium, with sometimes black triangles in the basal angles of the scutellum. In dark forms the black stripes of the elytra may fuse and make the whole elytron, except the costal margin, almost black.

External genitalia: As in typical *punctifrons.*

Internal male genitalia: Styles very characteristic, broadest at point of attachment to connective, then narrowing to middle and again widening, the preapical incision on lateral margin deep and extending cephalomesad, forming a distinct shoulder on lateral margin which bears several hairs, the terminal process long, directed caudo-laterad, obliquely truncate apically, forming a produced and acute lateral angle, the inner margin with a few preapical small teeth; connective Y-shaped, the arms bending distally around the styles, the stem about as long as the arms, divided and slightly emarginate basally; œdagus with a large wide dorsal plate-like process at the base which extends dorsad to the membrane from the anal tube, the distal portion wide at base, then narrowing, widening again, and then gradually tapering to the blunt, slightly concavely-tipped apex just before which there are two small sword-shaped, acutely-tipped lateral processes.

Distribution: Most of our specimens are from Hamilton county. It has also been taken at Kansas City, Mo.

Hosts: Willow.

Cicadula variata (Fall.).

Cicada variata Fall., Acta Holm, xxvii, p. 34, 1806.
Jassus variata H. S., Nomen. Ent., i, p. 70, 1835.
Jassus fumatus H. S., Fauna Germ., fasc. 153, 5, 1838.
Thamnotettix variata Kirschb., Cicad. v. Wiesbd., p. 99, 1868.
Limotettix variata Sahlb., Cicad., p. 250, 1871.
Cicadula variata Fieb., Revue d'Ent., iv, p. 51, 1885.
Cicadula variata Van D., Psyche, vi, p. 305, 1892.
Cicadula variata Edw., Hemip. Homop. Brit. Isds., p. 185, pl. 21, fig. 6, 1896.
Cicadula variata Osb., 20th Rept. N. Y. St. Ent., p. 540, 1905.
Cicadula variata Osb., Me. Agr. Exp. Sta., Bul. 238, p. 145, 1915.
Cicadula variata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 94, 1916.
Cicadula variata Van D., Cat. Hemip. N. A., p. 693, 1917.
Cicadula variata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 106, 1919.

Form: Fairly elongate. Length, 3.75 to 4.25 mm. Vertex about one-half longer on middle than next the eye, nearly or fully twice as wide as long, apex obtusely angled. Pronotum twice as wide as long, lateral margins very short, posterior margin very slightly emarginate. Elytra moderately broad, greatly exceeding abdomen.

Color: Yellowish or yellowish-green. Vertex with two large black spots near posterior margin and a pair on the anterior margin between the vertex and the front. Scutellum with two large black spots in basal angles, the anterior portions showing through the pronotum. Elytra whitish hyaline, often smoky, especially on basal two-thirds, and with a light spot on the claval suture. Nervures light. Face unmarked, or with sutures of front black.

External genitalia: Female, last ventral segment short, about as long as the preceding, posterior margin truncated; pygofers nearly or fully equalling the black ovipositor, the apices with a few white spines. Male, valve long, triangular, apex obtusely rounded, nearly covering the narrow plates.

Distribution: Specimens are at hand from Douglas, Pottawatomie, and Riley counties. It probably occurs throughout the eastern part of the state.

Hosts: This species is reported from grasses and weeds. Our specimens were taken at lights.

Cicadula lepida Van D.

Cicadula lepida Van D., Can. Ent., xxvi, p. 139, 1894.
Cicadula lepida Osb., 20th Rept. N. Y. St. Ent., p. 540, 1905.
Cicadula lepida DeL., Tenn. St. Bd. Ent., Bul. 17, p. 94, 1916.
Cicadula lepida Van D., Cat. Hemip. N. A., p. 694, 1917.
Cicadula lepida Fent., Ohio Jl. Sci., xviii, p. 185, 1918.
Cicadula lepida Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 106, 1919.

Having no specimens of this species at hand, we copy the following description from De Long:

"Resembling *variata*, but distinguished from it by the vertex more produced on the middle, and with a black spot next each eye. Length, 3.5 to 4 mm.

"Vertex bluntly angulate, slightly more than half longer on the middle than next the eye, more angulately produced than *variata*

"*Color:* Yellow, often tinged with green; vertex with two spots near the base, two large spots on apex, a vertical mark either side, between ocellus and eye, and often short, frontal arcs, black. Elytra whitish, often tinged with yellow, smoky at apex, nervures pale.

"*Genitalia:* Female, last ventral segment rather short, slightly emarginate at middle; pygofers as long as black ovipositor, clothed with white spines. Male, valve large and rounded, plates short, convexly rounding to rather blunt apices, outer margins with long white spines."

Distribution: Specimens of this species have been taken in Douglas and Pottawatomie counties.

Hosts: De Long reports sweeping specimens from small grass in low, swampy ground.

Cicadula sexnotata (Fall.).

(Pl. 15, figs. 5-6.)

Cicada sexnotata Fall., Acta Holm, xxvii, p. 34, 1806.
Jassus sexnotata Burm., Genera Ins., pl. 14, 1838.
Cicadula sexnotata Zett., Ins. Lapp., column 297, 1840.
Thamnotettix sexnotata Stal, Stet. Ent. Zeit., xix, p. 194, 1858.
Macrosteles sexnotata Fieb., Verh. Zoöl.-Bot. Ges. Wien., xvi, p. 504, 1866.

Limotettix sexnotata Sahlb., Cicad., p. 247, 1871.
Cicadula sexnotata Fieb., Revue d'Ent., iv, p. 47, 1885.
Cicadula 4-lineata Forbes, Rept. Ill. St. Ent., xiv, p. 68, pl. 5, fig. 4, 1884.
Cicadula sexnotata Woodw., Psyche, v, p. 75, 1888.
Cicadula sexnotata Osb., 20th Rept. N. Y. St. Ent., p. 539, 1905.
Cicadula sexnotata Osb., U. S. Dept. Agr., Bur. Ent., Bul. 108, p. 97, fig. 27, 1912.
Cicadula sexnotata Osb., Me. Agr. Exp. Sta., Bul. 238, p. 147, 1915.
Cicadula sexnotata Osb., Me. Agr. Exp. Sta., Bul. 248, p. 59, 1916.
Cicadula sexnotata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 95, 1916.
Cicadula sexnotata Van D., Cat. Hemip. N. A., p. 694, 1917.
Cicadula sexnotata Ell., Vort. Landburg, xxxvii, No. 40, p. 453, 1918.
Cicadula sexnotata Fent., Ohio Jl. Sci., xviii, p. 185, 1918.
Cicadula sexnotata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 107, 1919.

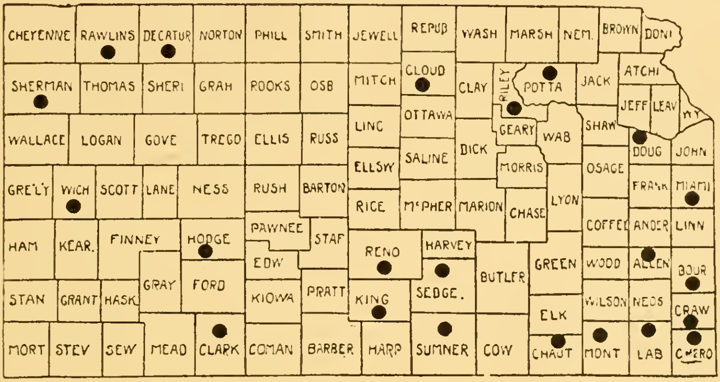
Form: Distinctly elongate. Length, 3.5 to 4 mm. Vertex slightly longer at middle than next the eye, nearly or fully twice as wide as long, broadly rounding with front. Pronotum broadly convex anteriorly, very slightly concave posteriorly, lateral margins very short. Elytra greatly exceeding abdomen.

Color: Yellowish or yellowish-green. Vertex with a pair of black spots posteriorly, and two pairs of black transverse lines, one pair on the anterior margin, the other pair between these and the posterior spots, also a black line between the reddish ocelli and the eyes. Pronotum frequently darker or with black showing through, especially on posterior portion. Elytra yellowish-gray, often smoky apically. Face with sutures, arcs on front, and median longitudinal line, black.

External genitalia: Female, last ventral segment rather short, posterior margin truncated; pygofers equalling the black ovipositor, with a few white spines apically. Male, valve large, triangular, apex obtusely rounded; plates small, projecting beyond the valve about the length of the latter and then produced into two attenuated apices which nearly or quite equal the bristly pygofers.

Internal male genitalia: Styles with large anterior process, a fair-sized process to connective, concave laterally just before the middle and then mesally concave just after the middle, strongly notched laterally to form a somewhat curved bluntly pointed terminal process; connective in the shape of a broad Y, the arms rounding, the stem widening distally; œdagus curved at base, long and slender, deeply cleft at apex to form two strap-like subacutely pointed processes, the dorsally extending basal process quite large.

Distribution: This is one of our most abundant species. It is found in every part of the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
EDW
RENO
HARVEY
BUTLER
GREEN
COFFEE
ANDER
LINN
WOOD
ALLEN
BOUR
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING
SEDGE.
WILSON
NEOS
CRAW
ELK
MORT
STEV
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Feeds on a great variety of plants. Often is a pest to crops because of its large numbers. Doctor Osborn records it as feeding upon oats, timothy, corn, potatoes, and pasture grasses.

Genus BALCLUTHA Kirk.

The members of this genus are rather elongate slender species. The head is narrower than the pronotum and the vertex is short, the margins nearly parallel. The elytra are very long, greatly exceeding the abdomen, overlapping apically, with a distinct appendix, and with only two anteapical cells. The hind wings have only two apical cells.

Only two members of this genus have been taken in Kansas.

KEY TO SPECIES.

A.	Elytra with black or brown spots.	*punctata.*
AA.	Elytra unicolorous.	*impicta.*

Balclutha punctata (Thunb.).

(Pl. 16, figs. 1-2.)

Cicada punctata Thunb., Acta Upsala, iv, p. 21, 1782.
Eupteryx clypeata Curt., Brit. Ent., xiv, p. 640, 1837.
Cicadula spreta Zett., Ins. Lapp., column 298, 1840.
Jassus punctatus Walk., List Homop., iii, p. 877, 1851.
Typhlocyba vernalis Fh. MS., in collections.
Gnathodus punctatus Fieb., Verh. Zoöl.-Bot. Ges. Wien., xvi, p. 505, 1866.
Thamnotettix punctatus Kirschb., Cicad. v. Wiesbd., p. 90, 1868.
Typhlocyba rosea Prov., Nat. Can., iv, p. 378, 1872.
Typhlocyba punctata Prov., Pet. Faune Ent. Can., iii, p. 301, 1890.
Typhlocyba jacosa Prov., Pet. Faune Ent. Can., iii, p. 300, 1890.

Gnathodus punctatus Mel., Cicad. Mitt. Eur., p. 314, pl. 12, figs. 5-8, 1896.

Gnathodus punctatus Edw., Hemip. Homop. Brit. Isds., p. 191, pl. 21, fig. 10, 1896.

Balclutha punctata Mats., Termes. Fuzet., xxv, p. 358, 1902.

Balclutha punctata Osb., Me. Agr. Exp. Sta., Bul. 238, p. 149, 1915; Bul. 248, p. 79, 1916.

Balclutha punctata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 96, 1916.

Balclutha punctata Van D., Cat. Hemip. N. A., p. 696, 1917.

Form: Distinctly elongate, narrowing posteriorly. Length, 3.5 to 4 mm. Head much narrower than pronotum, vertex slightly longer on middle than next the eye, over three times as wide as long, sloping, and broadly rounding with front. Pronotum long, anterior margin strongly convex, posterior margin slightly concave, broadest at lateral angles. Elytra very long, overlapping at apex.

Color: Greenish or yellowish-green. Vertex yellowish-green, unmarked, or with three faint brownish longitudinal stripes. Pronotum yellowish-green, darker on the disc, unmarked, or with five brownish longitudinal stripes. Scutellum pale, often with basal angles and two spots on disc fuscous. Elytra greenish with hyaline smoked tips or milky-white with green nervures, always marked with black or brown spots. Face yellowish-green, often washed with fuscous.

External genitalia: Female, last ventral segment long, posterior margin truncate; pygofers long and narrow, spiny, equalling ovipositor. Male, valve very small, just visible from under last ventral segment, rounded posteriorly; plates broad, triangular, spiny margins convexly narrowing to the produced and filamentous apices which nearly equal the pygofers.

Internal male genitalia: Styles truncate anteriorly, lacking the usual anterior process, then narrowing on both sides, especially the inner, to the middle, then widening to a subacute angle on the lateral margin formed by a deep and fairly wide lateral incision which bears a few hairs, the apical process long and narrow and curving strongly to the acute tip; connective Y-shaped, the arms widest at point of attachment to styles, then narrowed and bent mesad anteriorly, the stem longer than the rounding arms, and widened and slightly concave basally; œdagus with a large swollen base, then suddenly narrowing to a long delicate terminal lash.

Distribution: Douglas county seems to be the only one in which this species has yet been taken. The Snow collection also contains specimens from Kansas City, Mo. It probably occurs throughout the eastern portion of the state.

Hosts: Professor Osborn counts this species as of probable economic importance due to its occurring in grasses and cereal crops. He mentions Canadian bluegrass as a definite host. The writer has taken this species on *Elymus* in Douglas county.

Balclutha impicta (Van D.).

(Pl. 16, figs. 3-4.)

Gnathodus impictus Van D., Can. Ent., xxiv, p. 113, 1892.
Balclutha impictus Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 229, 1909.
Balclutha impictus Osb., Me. Agr. Exp. Sta., Bul. 238, p. 149, 1915.
Balclutha impictus DeL., Tenn. St. Bd. Ent., Bul. 17, p. 96, 1916.
Balclutha impicta Van D., Cat. Hemip. N. A., p. 697, 1917.

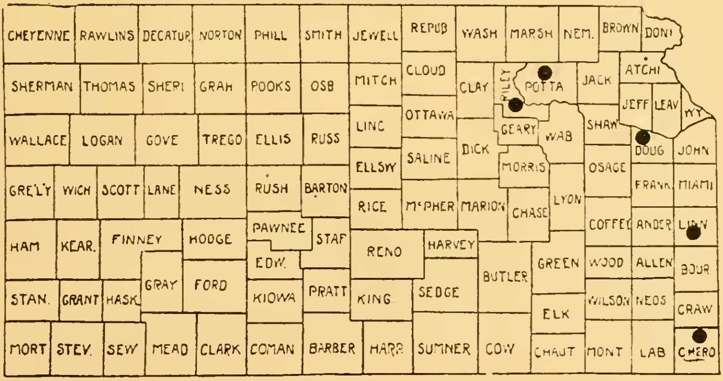
Form: Slightly smaller than *punctata.* Length, 3.5 to 3.75 mm. Head narrower than pronotum, vertex very slightly longer on middle than next the eye, over three times as wide as long. Pronotum long, anterior margin strongly convex, posterior margin very slightly emarginate. Elytra very long, greatly exceeding abdomen, narrow, overlapping apically.

Color: Greenish, sometimes tinged with yellow, Elytra greenish basally, becoming whitish apically.

External genitalia: Female, last ventral segment rather long, posterior margin truncate; pygofers long and narrow, widest at middle, spiny, equalling ovipositor. Male, valve distinct, nearly semicircular; plates small, margins convexly narrowing to the attenuate tips which are strongly exceeded by the pygofers.

Internal male genitalia: Styles produced anteriorly into a wide process, widest at point of attachment to connective by a rounded inner lobe, preapical lateral incision nearly semicircular, the terminal process rather short, curved, the apex more heavily chitinized and roughened; connective Y-shaped, the arms stout and triangular, separated by a rather narrow incision, the stem longer than the arms, widened to the truncate apex; œdagus with a broad rectangular dorsally-directed attachment process at the base, the main portion swollen basally and gradually tapering to the broad but rather deeply bifid apex, so that it seems to end in two delicate processes.

Distribution: This species seemingly is found throughout the eastern part of the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK
ATCHI
OTTAWA
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
GEARY
WAB
SHAW
DOUG
JOHN
SALINE
DICK
MORRIS
OSAGE
ELLSW
GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
LYON
FRANK
MIAMI
RICE
McPHER
MARION
CHASE
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
EDW.
GREEN
WOOD
ALLEN
BOUR
BUTLER
GRAY
FORD
STAN.
GRANT
HASK
KIOWA
PRATT
KING
SEDGE
WILSON
NEOS
CRAW
ELK
MORT
STEV.
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: No definite host plant seems yet to have been found for this species. It is undoubtedly a grass feeder.

Genus EUGNATHODUS Bak.

The members of this genus are very much like those of *Balclutha,* being long and slender, the elytra long and greatly exceeding the abdomen, with only two anteapical cells, and a distinct appendix. The wings also possess but two apical cells. Here, however, the head is distinctly wider than the pronotum and thus these forms are readily separable from those of the preceding genus.

One member of the genus occurs in Kansas.

Eugnathodus abdominalis (Van D.).

(Pl. 16, figs. 5-6.)

Gnathodus abdominalis Van. D., Can. Ent., xxiv, p. 113, 1892.
Eugnathodus abdominalis Bak., Invert. Pacifica, i, p. 2, 1903.
Balclutha abdominalis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 95, 1916.
Eugnathodus abdominalis Van D., Cat. Hemip. N. A., p. 697, 1917.
Eugnathodus abdominalis Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 107, 1919.

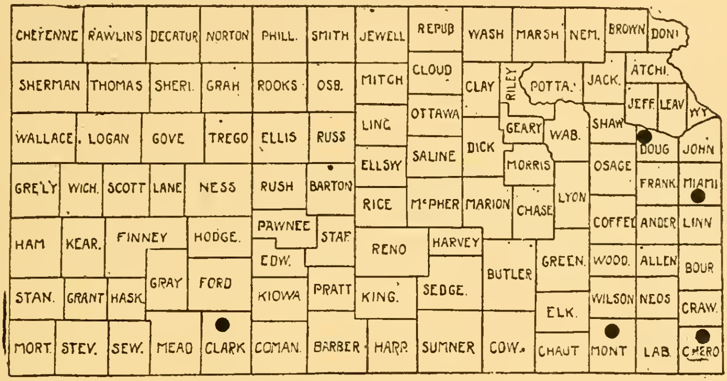
Form: Distinctly elongate, tapering posteriorly. Length, 3 to 3.5 mm. Head as wide or slightly wider than the pronotum. Vertex short, slightly longer at middle than next the eye, about three times as wide as long. Pronotum broadly rounded anteriorly, not as much produced as in *Balclutha,* lateral angles sharp, posterior margin very slightly emarginate. Elytra very long, greatly exceeding abdomen, strongly overlapping apically, appendix distinct, only two anteapical cells. Wings with two apical cells.

Color: Greenish, tinged with whitish on elytra and fuscous on vertex, pronotum, and scutellum. Pronotum sometimes with three dark longitudinal lines.

External genitalia: Female, last ventral segment short, slightly sinuate on either side of a very slight median prominence; pygofers long and narrow, widest at the middle, slightly exceeded by the ovipositor. Male, valve broad, rounded posteriorly; plates broad basally, short, spiny lateral margins convexly narrowing to the divergent apices, which are exceeded by the pygofers.

Internal male genitalia: Styles with an anterior process, a large rounded lobe to connective, then suddenly narrowed, the terminal process curved outward, rather short and stout; connective Y-shaped, the arms widely separated and curved apically around styles, the stem longer than the arms, widened basally; œdagus enlarged basally, with a small dorsally directed plate, then rapidly narrowed to long terminal process, which curves dorsad and ends rather obtusely.

Distribution: Most abundant in the eastern counties of the state, as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL.
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA.
JACK.
ATCHI.
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE.
PAWNEE
STAF
EDW.
RENO
HARVEY
BUTLER
GREEN.
WOOD.
ALLEN
BOUR
STAN.
GRANT
HASK.
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
ELK.
WILSON
NEOS
CRAW.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT
LAB.
CHERO

Hosts: Probably a grass feeder.

Tribe TYPHLOCYBINI (Kirschb.).

The members of this tribe are rather uniformly small species, elongate and fragile. They differ from the other tribes of the *Jassinæ* and from other *Cicadellidæ* in two particulars chiefly, namely, that the four sectors of the elytra run to the cross nervures without branching so that there are no anteapical cells, and in the fact that the ocelli are often wanting.

The tribe is divided into a number of genera, six of which are represented in our fauna. The genus *Eupteryx,* though not represented in the state, is included in the key.

The following key to the genera is adapted from Gillette, Proc. U. S. Natl. Mus., xx, p. 710, 1898. I have followed the nomenclature given by McAtee, Proc. Biol. Soc. Wash., xxxi, p. 109, 1918.

KEY TO GENERA.

A. Sectors of posterior wings ending in a marginal vein.
  B. Elytra with an appendix. *Alebra.*
  BB. Elytra without an appendix.
    C. Two apical cells in posterior wing. *Dikraneura.*
    CC. One apical cell in posterior wing. *Empoasca.*
AA. Sectors of posterior wings ending in wing margin, no marginal vein.
  B. All four sectors extending to the wing margin. *Eupteryx.*
  BB. Sectors one and two uniting so that only three veins extend to the wing margin.
    C. First and third apical cells of elytra contiguous at base, second apical cell triangular. *Typhlocyba.*

AA. Sectors of posterior wings—*concluded.*

CC. First and third apical cells of elytra completely separated by the second oblong apical cell.

D. Scutellum thickened and distinctly elevated apically. *Hymetta.*

DD. Scutellum not thickened and elevated apically. *Erythroneura.*

Genus ALEBRA Fieb.

The members of this genus are slender forms with a bluntly rounded head which is narrower than the pronotum. Ocelli are present. The elytra greatly exceed the abdomen, overlap at the apex, and have a distinct appendix. The sectors of the under wings end in a marginal vein and there are three apical cells.

One species and a variety have been taken in the state.

Alebra albostriella (Fall.).

Cicada albostriella Fall., Hemip. Suec. Cicad., p. 54, 1826.

Cicada elegantula Zett., Fauna Lapp., i, p. 536, 1828.

Cicadula elegantula Zett., Ins. Lapp., column 298, 1840.

Typhlocyba albostriella Flor, Rhyn. Livl., ii, p. 382, 1861.

Typhlocyba pallidula Walsh, Proc. Bost. Soc. Nat. Hist., ix, p. 315, 1864.

Compsus albostriella Sahlb., Cicad., p. 156, 1871.

Alebra albostriella Fieb., Revue d'Ent., iii, p. 40, 1884.

Alebra pallida Woodw., Psyche, v, p. 213, 1889.

Alebra albostriella Mel., Cicad. Mitt. Europ., p. 316, pl. 12, figs. 9, 10, 1896.

Alebra albostriella Edw., Hemip. Homop. Brit. Isds., p. 193, pl. 22, fig. 1, 1896.

Alebra albostriella Gill., Proc. U. S. Natl. Mus., xx, p. 713, 1898.

Alebra albostriella DeL., Tenn. St. Bd. Ent., Bul. 17, p. 97, 1916.

Alebra albostriella Van D., Cat. Hemip. N. A., p. 699, 1917.

Alebra albostriella Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 109, 1919.

The following description of this species is given by De Long:

"Rather robust, long, yellow or white in color. Length, 3.5 to 4 mm.

"Head blunt, parallel-margined, slightly curved anteriorly. Pronotum wider than head including eyes, elytra long, rather narrow.

"*Color:* Male, usually bright yellow, apices of elytra fumose. Female, varying, usually white, pronotum with two stripes, a broad one on suture and one along costa of elytra, yellow, head and pronotum often brown."

Distribution: The only record of this species for the state is from Pottawatomie county.

Hosts: De Long records taking specimens from willows, grapevines and weeds. Crevecoeur took specimens from burr oak.

Alebra albostriella var. *fulveola* (H. S.).

Typhlocyba fulveola H. S., Fauna Germ., cxiv, No. 16, 1839.

Typhlocyba aurea Walsh, Proc. Bost. Soc. Nat. Hist., ix, p. 315, 1864.

Compsus fulveola Sahlb., Cicad., p. 158, 1871.

Alebra albostriella var. *fulveola* Fieb., Revue d'Ent., iii, p. 41, 1884.

Alebra albostriella var. *fulveola* Edw., Hemip. Homop. Brit. Isds., p. 193, pl. 22, fig. 2, 1896.

Alebra albostriella var. *fulveola* Van D., Cat. Hemip. N. A., p. 699, 1917.

Form: That of the preceding. Length, 3.5 to 4 mm. Head narrower than the pronotum, blunt anteriorly, the vertex one-half wider than long. Pronotum twice as wide as long, broadly rounded anteriorly, lateral margins fairly long, posterior margin somewhat emarginate. Elytra very long, greatly exceeding the abdomen.

Color: The specimens at hand are almost uniformly orange-yellow, the elytra pale apically, and often with a pruinose spot along costal margin. Beneath and legs the same color except for the black tarsal claws.

External genitalia: Male, last ventral segment half longer than the preceding, strongly narrowed posteriorly, keeled posterior margin truncate or slightly emarginate; valve present, but hidden under last ventral segment unless the latter be raised up, small and rounded posteriorly; plates very large, suddenly narrowed preapically and then parallel-margined to the blunt bristly apices which far exceed the pygofers.

Distribution: Specimens are at hand from Douglas county and also from Kansas City, Mo., indicating its occurrence in the eastern portion of the state.

Hosts: Unknown.

Genus DIKRANEURA Hardy.

The members of this genus are small and quite slender. The vertex is usually obtusely produced anteriorly. The elytra greatly exceed the abdomen but lack an appendix, thus differing from *Alebra.* The sectors of the hind wings all end in a marginal vein and there are two apical cells, differing in the latter respect from *Empoasca* where only one apical cell is found.

Two species of this genus have been collected in Kansas. These may be separated by the following key:

KEY TO SPECIES.

A. Vertex strongly produced, two reddish longitudinal lines on vertex and pronotum. *abnormis.*
AA. Vertex shorter, usually reddish apically, without longitudinal lines. *fieberi.*

Dikraneura abnormis (Walsh).

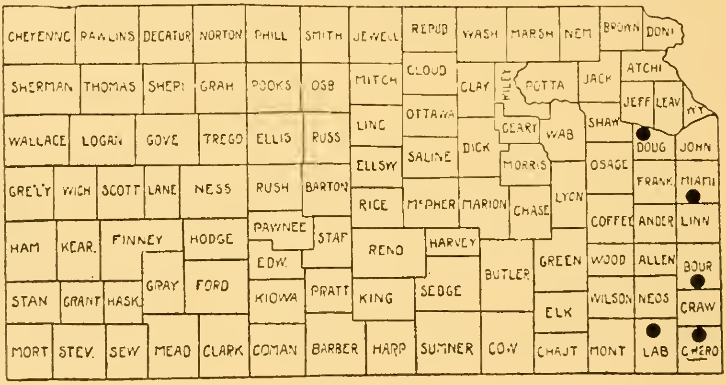
Chloroneura abnormis Walsh, Proc. Bost. Soc. Nat. Hist., ix, p. 316, 1864.
Dicraneura abnormis Woodw., Psyche, v, p. 213, 1889.
Dicraneura abnormis Gill., Proc. U. S. Natl. Mus., xx, p. 719, 1898.
Dicraneura abnormis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 98, 1916.
Dikraneura abnormis Van D., Cat. Hemip. N. A., p. 700, 1917.
Dikraneura abnormis Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 110, 1919.

Form: Very slender. Vertex over twice as long at middle as next the eye, one-third wider than long, acutely angled apically. Pronotum long and narrow, one-half longer than vertex, lateral margins long, slightly widening posteriorly, humeral margins short, posterior margin distinctly concave. Elytra very long and narrow.

Color: Vertex and pronotum yellowish, with two broad reddish longitudinal stripes. Scutellum yellowish. Elytra greenish, nervures yellowish especially apically where the elytra become hyaline. Face pale. Abdomen black.

External genitalia: Female, last ventral segment rather short, narrow, posterior margin broadly but slightly convex; pygofers long and narrow, exceeded by ovipositor, somewhat hairy along mesal margins and apically. Male, valve large, broad, lateral margins roundingly narrowed posteriorly, posterior margin truncate; plates broad, narrowing rather concavely to the attenuate and divergent tips which are upturned and exceed the pygofers.

Distribution: This species seemingly is found only in the eastern portion of the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
DICK
SALINE
ELLSW
MORRIS
OSAGE
GRELY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
EDW.
RENO
HARVEY
BUTLER
GREEN
WOOD
ALLEN
BOUR
STAN
GRANT
HASK.
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
ELK
WILSON
NEOS
CRAW
MORT
STEV.
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Occurs on a large number of grasses.

Dikraneura fieberi (Loew).

Notus fieberi Loew in Then, Kat. Ostr. Cicad., p. 39, 1886.
Notus forcipatus Fieb., Revue d'Ent., iii, p. 53, 1884.
Dicraneura fieberi Mel., Cicad. Mitt. Eur., p. 325, 1896.
Dicraneura fieberi Gill., Proc. U. S. Natl. Mus., xx, p. 722, 1898.
Dicraneura fieberi Osb., Me. Agr. Exp. Sta., Bul. 238, p. 151, 1915.
Dicraneura fieberi DeL., Tenn. St. Bd. Ent., Bul. 17, p. 98, 1916.
Dikraneura fieberi Van D., Cat. Hemip. N. A., p. 701, 1917.
Dikraneura fieberi Fent., Ohio Jl. Sci., xviii, p. 186, 1918.
Dikraneura fieberi Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 110, 1919.

Form: Length about 3.5 mm. Vertex not as produced as in *abnormis*, more rounded apically, over one-half longer at middle than next the eye, nearly twice as wide as long. Pronotum long, only about one-third wider than long, lateral margins straight, humeral margins short. Elytra long and narrow.

Color: Light yellow. Vertex yellowish, often with the apical portion distinctly reddish. Pronotum yellowish, the disc sometimes reddish or orange colored. Elytra yellowish, nervures yellow, often quite hyaline, especially at the tips.

External genitalia: Female, last ventral segment very short laterally, posterior margin incised on either side of a large produced median lobe whose margins taper slightly from the broad base to the rounded apex; last abdominal tergite large and inflated, appearing as two broad lobes at the base of the pygofers, which are broad, mesally spiny, and nearly or fully equal the ovipositor. Male, valve very large and inflated, a little wider than long, lateral margins rounded, posterior margin truncate or slightly concave, with a longitudinal median line; plates projecting from under the valve as two large style-like processes, spiny, curved dorsally, with a distinct black tooth on inner margin before the black-tipped apices, which exceed the pygofers.

Distribution: Taken hitherto only in Cherokee and Douglas counties. Probably occurs throughout the eastern part of the state.

Hosts: This is a grass-feeding species which, according to Osborn, may be of economic importance because of occurring in large numbers on cultivated grasses, such as timothy.

Genus EMPOASCA Walsh.

The forms belonging to this genus are slender, greenish species, very largely unicolorous. The elytra are long and lack an appendix. The sectors of the hind wings end in a marginal vein, thus agreeing with the two preceding genera, but in this genus there is only one apical cell. Ocelli are present.

The six species keyed below have been collected in the state. Other species have been taken, but I am not quite certain as to their specific identity.

KEY TO SPECIES.

A. Vertex rounded, at most but slightly produced medially.
B. Elytra with two transverse dark stripes. *trifasciata.*
BB. Elytra without transverse stripes.
C. Size large, robust, length usually about 4 mm., elytra unicolorous. *obtusa.*
CC. Size smaller, more slender, seldom exceeding 3.5 mm., claval suture of elytra whitish. *albolinea.*
AA. Vertex distinctly produced medially.
B. Pronotum with a pale median line, nervures of elytra pale. *alboneura.*
BB. Pronotum without pale line, nervures not pale.
C. Pronotum with six or eight white spots on anterior margin. *mali.*
CC. Pronotum with three white spots on anterior margin. *flavescens.*

Empoasca trifasciata Gill.

Empoasca trifasciata Gill., Proc. U. S. Natl. Mus., xx, p. 726, 1898.
Empoasca trifasciata Osb., 20th Rept. N. Y. St. Ent., p. 542, 1905.
Empoasca trifasciata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 99, 1916.
Empoasca trifasciata Van D., Cat. Hemip. N. A., p. 702, 1917.
Empoasca trifasciata Weiss & Dick., Can. Ent., L, p. 201, 1918.
Empoasca trifasciata Weiss, Ent. News, xxix, p. 310, 1918.

Form: Length, 4 to 4.25 mm. Vertex very slightly longer at middle than next the eyes, obtusely rounded apically, twice as wide as long. Pronotum long, one-half wider than long, lateral margins long, widening posteriorly, humeral margins shorter, posterior margin slightly emarginate. Elytra very long, greatly exceeding abdomen.

Color: Greenish. Vertex greenish-yellow. Pronotum yellowish anteriorly, with a dark brown band on the posterior part. Scutellum yellowish basally, greenish apically. Elytra greenish, with broad smoky or brownish bands across middle of clavus and at apex. Face yellowish above, greenish below, sometimes with a white median longitudinal line.

External genitalia: Female, last ventral segment long, posterior margin roundingly produced medially; pygofers moderately robust, long, slightly exceeded by ovipositor.

Distribution: Douglas and Riley counties seem to be the only counties in the state where this species has yet been taken.

Hosts: Weiss and Dickerson give Carolina and Lombardy poplars as hosts.

Empoasca obtusa Walsh.

Empoasca obtusa Walsh, Proc. Bost. Soc. Nat. Hist., ix, p. 316, 1864.
Empoasca obtusa G. & B., Hemip. Colo., p. 109, 1895.
Empoasca obtusa Gill., Proc. U. S. Natl. Mus., xx, p. 733, 1898.
Empoasca obtusa Webs., Ent. News, xxi, p. 265, 1910.
Empoasca obtusa Osb., Me. Agr. Exp. Sta., Bul. 238, p. 153, 1915.
Empoasca obtusa Leon., Ent. News, xxvii, p. 49, 1916.
Empoasca obtusa DeL., Tenn. St. Bd. Ent., Bul. 17, p. 100, 1916.
Empoasca obtusa Van D., Cat. Hemip. N. A., p. 703, 1917.
Empoasca obtusa McAt., Can. Ent., L, p. 360, 1918.
Empoasca obtusa Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 111, 1919.

Form: Rather robust. Length, 4 mm. Head broad; vertex slightly longer medially than next the eye, over twice as wide as long, broadly rounded apically. Pronotum long, less than twice as wide as long, lateral margins long and widening posteriorly, humeral margins short, posterior margin distinctly emarginate. Elytra long and narrow, greatly exceeding the abdomen.

Color: Pale green or yellowish-green. Vertex sometimes marked with fuscous. Pronotum usually with three fairly large white spots on anterior margin, and sometimes the posterior margin marked with bright green. Scutellum frequently with a broad white median line. Elytra yellowish or greenish, subhyaline, sometimes smoky and with some of the nervures bright green.

External genitalia: Female, last ventral segment long, posterior margin roundingly produced, but with the sides not sinuous; pygofers long, rather bristly, slightly exceeded by ovipositor. Male, last ventral segment over twice the length of the preceding, broad, posterior margin broadly rounding, covering the valve; plates broad and long, spiny, the upturned tips being laterally compressed and obtuse apically; pygofers very short, completely hidden by the plates.

Distribution: Fairly common in the eastern portion of the state as indicated by its occurrence in Douglas, Pottawatomie, Riley and Sedgwick counties.

Hosts: This species is usually abundant on willow. Leonard gives poplar as another host.

Empoasca albolinea Gill.

Empoasca albolinea Gill., Proc. U. S. Natl. Mus., xx, p. 732, 1898.
Empoasca albolinea Tuck., Kan. Univ. Sci. Bul., iv, p. 68, 1907.
Empoasca albolinea Van D., Cat. Hemip. N. A., p. 704, 1917.

Form: Length, 3.5 mm. Head not as broad and more rounding anteriorly than in *obtusa* Vertex slightly longer on middle than next the eye, over twice as wide as long, broadly rounding apically. Pronotum nearly three times as long as the vertex, less than twice as wide as long. Elytra characteristic of the genus.

Color: Greenish-yellow. Vertex with median white line and two white lateral spots or lines. Pronotum with three white spots on anterior margin and a characteristic pale median longitudinal line. Scutellum with white median line. Elytra yellowish, sometimes smoky, the claval suture broadly pale. Face yellowish above, greenish below, sometimes unmarked, sometimes with a median longitudinal line, a line next each eye, and a line between these and the median line, white.

External genitalia: Female, last ventral segment long, posterior margin produced and entire; pygofers moderately robust, spiny mesally, exceeded by ovipositor. Male, last ventral segment broad and long, covering the valve; plates as in *obtusa* but with a much thicker covering of much longer spines and hairs; pygofers very short, completely hidden by the plates.

Distribution: Our only records for this species are from Douglas county.

Hosts: Our specimens were taken at electric lights. Gillette gives willows as the host plant.

Empoasca alboneura Gill.

Empoasca alboneura Gill., Proc. U. S. Natl. Mus., xx, p. 743, 1898.
Empoasca alboneura DeL., Tenn. St. Bd. Ent., Bul. 17, p. 101, 1916.
Empoasca alboneura Van D., Cat. Hemip. N. A., p. 705, 1917.

Form: Short and fairly robust. Length about 3 mm. Vertex about one-third longer at middle than next the eye, over twice as wide as long.

Pronotum twice as wide as long, anterior margin strongly convex, lateral and humeral margins about equal, posterior margin distinctly concave. Elytra moderately long.

Color: Greenish-yellow. Vertex yellowish, a median line, a spot on either side, and one on posterior margin near each eye, white. Pronotum yellowish, becoming greenish posteriorly, anterior margin with three white spots, and with a distinct pale median longitudinal line. Scutellum yellowish, often with a broad white median line. Elytra greenish, apices smoky, nervures broadly pale. Face yellowish above, greenish below.

External genitalia: Female, last ventral segment long, posterior margin medially produced; pygofers rather robust, spiny, considerably exceeded by the ovipositor. Male, last ventral segment large, concave, and therefore the posterior margin appearing notched; plates long and narrow, each bearing two rows of long bristles, the tips upturned; pygofers very short, completely hidden by the plates.

Distribution: Gillette's record of specimens from Greeley county is our only record of this species in the state.

Hosts: De Long reports sweeping this species from weeds, grass, and red clover, and also taking it around lights.

Empoasca mali (LeB.).

(Pl. 16, figs. 7-8.)

Tettigonia mali LeB., Prairie Farmer, xiii, p. 330, 1853.
Empoa albopicta Forbes, 13th Rept. Ill. St. Ent., p. 181, pl. 14, 1884.
Empoasca mali Osb., Proc. Ia. Acad. Sci., i, pt. 2, p. 126, 1892.
Empoasca mali Gill., Proc. U. S. Natl Mus., xx, p. 744, 1898.
Empoasca mali Lugg., 6th Rept. Minn. St. Ent., p. 131, 1900.
Empoasca albopicta Washb., 9th Rept. Minn. St. Ent., p. 59, 1904.
Empoasca mali Washb., 9th Rept. Minn. St. Ent., p. 91, 1904.
Empoasca mali Osb., 20th Rept. N. Y. St. Ent., p. 543, 1905.
Empoasca mali Washb., U. S. Dept Agr., Bur. Ent., Bul. 52, p. 43, 1905.
Empoasca mali Washb., 12th Rept. Minn. St. Ent., p. 11, 1908.
Empoasca mali Webs., Jl. Ec. Ent.. ii, p. 211, 1909.
Empoasca mali Webs., Ent. News, xxi, p. 266, 1910.
Empoasca mali Webs., Ia. St. Col. Exp. Sta., Bul. 111, 1910.
Empoasca mali Washb., Jl. Ec. Ent., iii, p. 162, 1910.
Empoasca mali Sand., Jl. Ec. Ent., iii, p. 210, 1910.
Empoasca mali Washb., 13th Rept. Minn. St. Ent., p. 31, 1910.
Empoasca mali Osb., U. S. Dept. Agr., Bur. Ent., Bul. 108, p. 100, fig. 28, 1912.
Empoasca mali Hase., Jl. Ec. Ent., vi, p. 240, 1913.
Empoasca mali Ess., Inj. Benef. Ins. Calif., edn. 2. p. 62, 1915.
Empoasca mali Osb., Me. Agr. Exp. Sta., Bul. 238, p. 153, 1915.
Empoasca mali Webs., Ia. St. Col. Exp. Sta., Bul. 155, p. 395, 1915.
Empoasca mali Gibs., Can. Ent., xlviii, p. 178, 1916.
Empoasca mali DeL., Tenn. St. Bd. Ent., Bul. 17, p. 102, 1916.
Empoasca mali Van D., Cat. Hemip. N. A., p. 705, 1917.
Empoasca mali Lathr., Jl. Ec. Ent., xi, p. 144, 1918.
Empoasca mali Lathr., N. Y. Agr. Exp. Sta., Bul. 451, p. 185, 1918.
Empoasca mali Fent., Ohio Jl. Sci., xviii, p. 186, 1918.
Empoasca mali Ball, Jl. Ec. Ent., xii, p. 149, 2 pl., 1919.
Empoasca mali Ball, Wisc. Dept. Agr., Bul. 23, p. 76, 5 pl., 1919.
Empoasca mali Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 122, 1919.
Empoasca mali Fluke, Jl. Ec. Ent., xii, p. 256, 1919.
Empoasca mali Ack., U. S. Dept. Agr., Bur. Ent., Bul. 805, p. 1, 1919.

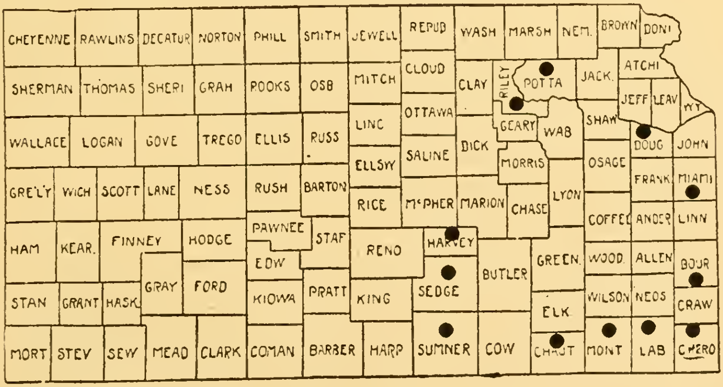
Form: Length, about 3.5 mm. Vertex one-third longer on middle than next the eye, distinctly produced, less than twice as wide as long. Pronotum twice as wide as long, anterior margin strongly convex, lateral and humeral margins about equal, posterior margin distinctly emarginate. Elytra long and narrow.

Color: Yellowish-green. Vertex with median line, dashes on either side anteriorly and posteriorly, white. Pronotum with six, sometimes with eight, white spots along anterior margin. Scutellum with a white "H" on anterior portion, and three white lines on posterior half. Elytra greenish, sometimes smoky. Face yellowish above, greenish below, with white median line and other white markings between it and the eyes.

External genitalia: Female, last ventral segment long, posterior margin slightly produced or truncate; pygofers rather robust, spiny mesally, exceeded by the ovipositor. Male, last ventral segment very large, posterior margin rounding; plates long and narrow, apices obtuse, upturned, and laterally compressed, thickly covered with white hairs and spines; pygofers very short, completely covered by the plates.

Internal male genitalia: Styles long and slender, sinuate; connective the form of an equilateral triangle with the corners rounded and the sides slightly concave; œdagus long and slender, very slender basally, then widening and again narrowing to tip when viewed laterally. Viewed dorsally it is enlarged apically into a blunt spearhead.

Distribution: This is by far the commonest member of this genus. Its recorded distribution for the state is shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
FRANK
MIAMI
GREELY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
RENO
HARVEY
EDW
BUTLER
GREEN.
WOOD
ALLEN
BOUR
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING
SEDGE
WILSON
NEOS
CRAW
ELK
MORT
STEV
SEW
MEAD
CLARK
COMAN
BARBER
HARP
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Hosts: Taken on a large variety of hosts and very abundantly at lights. Because of feeding on so many cultivated plants it is of decided economic importance. It is common on many members of the family *Leguminosæ*, especially on alfalfa and beans. It is often an apple pest. In the last year it has been attracting much attention due to its work on potatoes. Doctor Ball has shown that it is the means of producing "hopperburn" on this crop, and he has therefore proposed the name of "potato leafhopper" for this species, for it is now known to pass its life cycle on potato.

Empoasca flavescens (Fabr.).

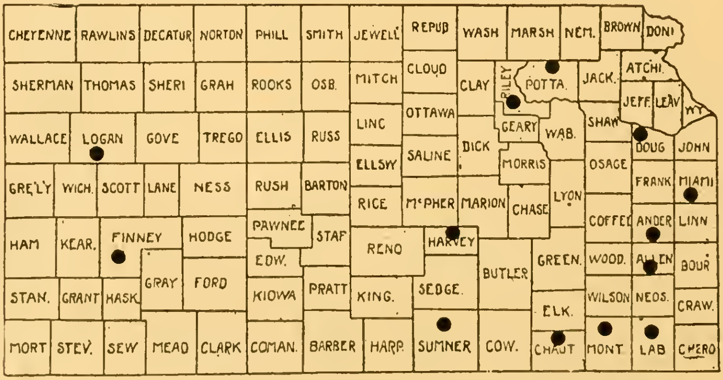
Cicada flavescens Fabr., Ent. Syst., iv, p. 46, 1794.
Typhlocyba flavescens Flor., Rhyn. Livl., ii, p. 394, 1861.
Cicadula flavescens Sahlb., Cicad., p. 161, 1871.
Chlorita flavescens Fieb., Revue d'Ent., iii, p. 57, 1884.
Empoasca flavescens Gill., Proc. U. S. Natl. Mus., xx, p. 745, 1898.
Empoasca flavescens Osb., 20th Rept. N. Y. St. Ent., p. 543, 1905.
Empoasca flavescens DeL., Tenn. St. Bd. Ent., Bul. 17, p. 102, 1916.
Empoasca flavescens Van D., Cat. Hemip. N. A., p. 706, 1917.
Empoasca flavescens Fent., Ohio Jl. Sci., xviii, p. 186, 1918.
Empoasca flavescens Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 112, 1919.

Form: Very much like *mali*. Length, about 3.5 mm. Vertex one-third longer at middle than next the eye, distinctly produced, one-half longer than wide. Pronotum less than twice as wide as long, anterior margin broadly convex, posterior margin distinctly concave. Elytra long and narrow.

Color: Yellowish or yellowish-green. Vertex with median line, and a pair each of anterior and posterior oblique lines, white. Pronotum usually with three white anterior spots. Scutellum usually with three white longitudinal lines on basal portion and a broad transverse white band back of impressed line. Elytra pale green, nervures indistinct, apically hyaline. Face yellowish above, greenish below, with broad white median line and whitish markings between this and the eye.

External genitalia: Female, last ventral segment long, posterior margin produced; pygofers rather robust, spiny mesally, exceeded by ovipositor. Male, last ventral segment over twice the length of the preceding; plates broad basally, regularly tapering to the rounded upturned apices, with a row of submarginal spines, and hairy marginally and apically; pygofers short, completely hidden by the plates.

Distribution: A very common species which is distributed all over the state as shown by the following map:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA.
JACK.
ATCHI.
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
M'PHER
MARION
CHASE
LYON
FRANK
MIAMI
PAWNEE
STAF
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE
EDW.
RENO
HARVEY
BUTLER
GREEN.
WOOD.
ALLEN
BOUR
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
WILSON
NEOS.
CRAW.
STAN.
GRANT
HASK
ELK.
MORT
STEV.
SEW
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT
LAB
CHERO

Hosts: Taken in abundance at lights. De Long records it from the same hosts as *mali,* namely, beans, peas, alfalfa, and apple.

Genus EUPTERYX Curt.

No members of this genus have yet been reported from Kansas. Unlike the three preceding genera the sectors of the hind wings end in the wing margin instead of in a marginal vein, and they differ from the two following genera in having four sectors instead of three.

McAtee shows that the old name *Eupteryx* should be retained for the genus rather than the name *Typhlocyba* as used by Van Duzee in his catalogue.

Genus TYPHLOCYBA Germ.

The members of this genus are characterized by having the first and third apical cells of the elytra contiguous at the base, by lacking a marginal vein in the hind wings, and having only three sectors reaching the margin of the wing.

Only one species has been taken in the state.

Typhlocyba rosæ (Linn.).

(Pl. 16, figs. 9-10.)

Cicada rosæ Linn., Syst. Nat. edn. 10, i, p. 439, 1758.
Cicada (Tettigonia) rosæ Geoff., Hist. Aberg. des Ins., i, p. 428, 1762.
Typhlocyba rosæ Burm., Handb. d. Ent., ii, p. 107, 1835.
Cicadula rosæ Zett., Ins. Lapp., column 300, 1840.
Tettigonia rosæ Harr., Ins. Inj. to Veg., p. 199, 1842.
Typhlocyba pteridis Dahlb., Kongl. Vet. Akad. Handl. for 1850, p. 179.
Tettigonia rosæ Harr., Rept. Ins. Mass., edn. 2, p. 182, 1852.
Typhlocyba lactea Dougl., Ent. Mo. Mag., xii, p. 77, 1875.
Anomia rosæ Fieb., Revue d'Ent., iii, p. 124, 1884.
Tettigonia rosæ Lint., 2nd Rept. N. Y. St. Ent., p. 31, 1885.
Tettigonia rosæ Lint., 6th Rept. N. Y. St. Ent., p. 166, 1890.
Tettigonia rosæ Lint., 7th Rept. N. Y. St. Ent., p. 345, 1891.
Empoa rosæ Lint., 8th Rept. N. Y. St. Ent., p. 256, 1893.
Typhlocyba rosæ G. & B., Hemip. Colo., p. 112, 1895.
Typhlocyba rosæ Gill., Proc. U. S. Natl. Mus., xx, p. 771, 1898.
Typhlocyba rosæ Lugg., Minn. Agr. Exp. Sta., Bul. 69, p. 131, 1900.
Typhlocyba rosæ Osb., 20th Rept. N. Y. St. Ent., p. 545, 1905.
Typhlocyba rosæ Felt, 25th Rept. N. Y. St. Ent., p. 90, 1910.
Typhlocyba rosæ Webs., Ent. News, xxi, p. 267, 1910.
Typhlocyba rosæ Felt, Jl. Ec. Ent., iv, p. 413, 1911.
Typhlocyba rosæ Felt, 27th Rept. N. Y. St. Ent., 1912.
Typhlocyba rosæ Ess., Inj. Benef. Ins. Calif., p. 62, 1915.
Typhlocyba rosæ Osb., Me. Agr. Exp. Sta., Bul. 238, p. 158, 1915.
Typhlocyba rosæ Wils. & Childs, 2d Bien. Crop Pest Rept., Ore. Agr. Exp. Sta., p. 189, 1915.
Typhlocyba rosæ Britt., Proc. Ent. Soc. Nova Scotia, No. 2, p. 48, 1916.
Typhlocyba rosæ DeL., Tenn. St. Bd. Ent. Bul. 17, p. 109, 1916.
Typhlocyba rosæ Britt., Nova Scotia Col. Agr., Circ. 17, 1917.

Empoa rosæ Van D., Cat. Hemip. N. A., p. 710, 1917.
Empoa rosæ Childs, Ore. Agr. Col. Exp. Sta., Bul. 148, 1918.
Empoa rosæ Lathr., Jl. Ec. Ent., xi, p. 144, 1918.
Empoa rosæ Lathr., N. Y. Agr. Col. Exp. Sta., Bul. 451, 1918.
Typhlocyba rosæ McAt., Can. Ent., l, p. 361, 1918.
Empoa rosæ Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 119, 1919.
Empoa rosæ Ack., U. S. Dept. Agr., Bur. Ent., Bul. 199. p. 20, 1919.

Form: Length, about 3.5 mm. Vertex one-third longer on middle than next the eye, less than twice as wide as long. Pronotum less than twice as wide as long, lateral margins long and broadening posteriorly, posterior margin emarginate. Elytra very long and narrow.

Color: Uniformly white or yellowish-white except for dark eyes and tarsal claws.

External genitalia: Female, last ventral segment twice as long as the preceding, narrowed posteriorly, posterior margin truncate; pygofers moderately broad, rather short, slightly exceeded by ovipositor, sparsely spiny apically. Male, valve broad but very short, lateral margins strongly narrowed posteriorly; plates long and narrow, lateral margins slightly concave just before middle and rather strongly emarginate apically, the black-tipped apices being divergent and curved dorsad; pygofers large, touching the tips of the plates, with a small terminal dorsal tooth.

Internal male genitalia: Styles very large, with a long cephalic process, after which is a distinct dorsal process, the tip of which is spiny, the terminal portion long and curving strongly apically; connective short, with three basal processes, the inner one more pointed than the outer two, the base broad; œdagus with a basal dorsally directed process which is narrow and straight at first, then widening and forming a large curving process running caudo-dorsad, terminal portion long and slender, curving, deeply bifid into two processes whose tips are suddenly narrowed and acute.

Distribution: This species is not as common in the state as might be expected. It perhaps is distributed well over the eastern part, but it is recorded as having been taken only in Douglas and Pottawatomie counties.

Hosts: Childs gives the following as hosts of this species: Wild and cultivated rose, apple, blackberry, raspberry, Loganberry, strawberry, dogwood, prune, cherry, and *Cratægus.* Gillette gives plum, cherry, currant, and grape in addition.

Genus HYMETTA McAtee.

This monotypic genus was lately erected by McAtee for the species till lately known as *Typhlocyba trifasciata,* but which Van Duzee placed under the genus *Erythroneura* in his catalogue. It differs from the latter genus, however, in having the scutellum thickened and distinctly elevated apically. Moreover, the second apical vein is curved, reaching the margin at the exterior angle of the elytra and often nearly or quite forming a stalk with the first apical vein. In *Erythroneura,* on the other hand, the second vein clearly reaches the posterior margin of the elytra and does not form a stalk with the first apical vein. It agrees with the latter genus in having the second apical cell oblong instead of stalked as in *Typhlocyba.*

Hymetta trifasciata (Say).

(Pl. 16, figs. 11-12.)

Tettigonia trifasciata Say, Jl. Acad. Nat. Sci. Phila., iv, p. 343; Compl. Writ., ii, p. 259.

Typhlocyba trifasciata Woodw., Psyche, v, p. 213, 1889.
Typhlocyba trifasciata Gill., Proc. U. S. Natl. Mus., xx, p. 755, 1898.
Typhlocyba trifasciata Osb., 20th Rept. N. Y. St. Ent., p. 544, 1905.
Typhlocyba trifasciata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 106, 1916.
Erythroneura trifasciata Van D., Cat. Hemip. N. A., p. 712, 1917.
Hymetta trifasciata McAt., Proc. Biol. Soc. Wash., xxxii, p. 121, 1919.
Erythroneura trifasciata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 113, 1919.

Form: Rather robust, widest at the middle. Length, about 3 mm. Head narrower than pronotum; vertex strongly produced, nearly twice as long at middle as next the eye, about one-half wider than long. Pronotum long, less than twice as wide as long, widest at lateral angles, anterior margin strongly convex, lateral margins widening posteriorly, posterior margin slightly concave. Elytra rather short and broad, nearly truncate apically.

Color: Vertex, pronotum, and scutellum creamy-yellow, elytra milky-white. Vertex and pronotum often unmarked, former sometimes with a pair of apical dashes and a pair of small circles on disc, red, besides other red marks. Pronotum sometimes with reddish marks back of the eyes and a red median line. Scutellum with tip always black. Elytra more or less irrorate with red, with a broad brownish to reddish transverse band just back of apex of scutellum, a faint smoky band, bounded posteriorly near the costa by a red line, and another faint band near the tip. Face pale, unmarked, or with a few reddish lines.

External genitalia: Female, last ventral segment about two-thirds as wide as preceding segment, triangular, about three-fourths as long as wide, the margins concavely tapering on the posterior two-thirds to the blunt apex; pygofers rather stout, spiny along ovipositor, exceeded by the latter. Male, valve broad but short, posterior margin truncate; plates broad basally, suddenly narrowed just before the middle, then tapering to acute upturned tips which exceed the short pygofers, margins with three or four spines at point where plates are narrowed.

Internal male genitalia: Styles with long anterior process, widening after union with connective, then narrowing again before their widest portion just cephalad of the preapical lateral incision which is very deep and U-shaped, the outer angle before the incision very prominent, the terminal process quite narrow basally but widening apically into two lateral teeth, the outer being longer and more pointed than the mesal one, the apex distinctly concave; connective stout, U-shaped; œdagus with two pairs of slender and acute lateral processes and a large curved terminal process, the blunt tip of which is serrate on the dorsal margin.

Distribution: Probably occurs throughout the eastern part of the state. Reported from Dauglas, Pottawatomie and Riley counties.

Hosts: Very common on grape and easily gathered from leaves in winter. McAtee also gives hickory as a host.

Genus ERYTHRONEURA Fh.

The members of this genus are very similar to the members of the genus *Typhlocyba,* but differ in having the second apical cell of the elytra completely separating the first and third apical cells. The hind wings lack a marginal vein and there are but three sectors extending to the margin.

After studying the internal male genitalia of the material available we find our state list to contain thirteen species and five varieties of this genus. In this paper six of the varieties have been given specific rank.

KEY TO SPECIES.

A. General color above yellowish or whitish.
  B. Elytra with definite transverse bars.
    C. Bands across pronotum and middle and apex of elytra. *tricincta.*
    CC. Broad brownish band across base of elytra. *basalaris.*
  BB. Elytra without definite transverse bands.
    C. Species marked with red spots above.
      D. Vertex and pronotum usually marked with red spots.
        E. Scutellum entirely red. *rubroscuta.*
        EE. Scutellum not entirely red.
          F. Vertex, pronotum, and scutellum each with a red spot. *illinoiensis.*
          FF. Vertex, pronotum, and scutellum each with several red spots. *maculata.*
      DD. Vertex and pronotum usually marked with red lines.
        E. Scutellum black. *scutelleris.*
        EE. Scutellum not black.
          F. Elytra blood red to near the cross veins. *crevecœuri.*
          FF. Elytra with zigzag red or blood red lines or spots. *comes.*
    CC. Species marked with oblique red lines above.
      D. Species yellowish, oblique lines distinct. *obliqua.*

A. General color above—*concluded.*
        DD. Species smoky or, if yellowish, with oblique lines fused.
            E. Species yellowish with broad dorsal stripe running the length of the insect. *dorsalis.*
            EE. Species smoky, without dorsal stripe. *fumida.*
AA. General color dark above.
    B. Reddish brown species. *vulnerata.*
    BB. Species black above, marked with white. *nigra.*

Erythroneura tricincta Fh.

(Pl. 16, figs. 15-16.)

Erythroneura tricincta Fh., Homop. N. Y. St. Cab., p. 63, 1851.
Typhlocyba tricincta Woodw., Psyche, v, p. 213, 1889.
Typhlocyba tricincta G. & B., Hemip. Colo., p. 113, 1895.
Typhlocyba tricincta Gill., Proc. U. S. Natl. Mus., xx, p. 753, 1898.
Typhlocyba tricincta Osb., 20th Rept. N. Y. St. Ent., p. 544, 1905.
Typhlocyba tricincta DeL., Tenn. St. Bd. Ent., Bul. 17, p. 104, 1916.
Erythroneura tricincta Van D., Cat. Hemip. N. A., p. 712, 1917.
Erythroneura tricincta Fent., Ohio Jl. Sci., xviii, p. 186, 1918.
Erythroneura tricincta Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 113, 1919.

Form: Length, about 3 mm. Vertex strongly produced, nearly twice as long on middle as next the eye, one-half wider than long. Pronotum about twice as wide as long, anterior margin broadly convex, lateral margins moderately long, slightly widening posteriorly, humeral margins rounding into slightly concave posterior margin. Elytra moderately long, widest at middle, giving insect oval outline.

Color: Vertex, pronotum, and scutellum pale yellow, elytra whiter. All but median anterior portion of pronotum, and usually base of scutellum, with a red to black transverse band. Elytra with a broad red band near middle, becoming black costally, and with a brown band apically, and with transverse veins, red, and sometimes with red streaks running backward from the middle band.

External genitalia: Female, last ventral segment long, posterior margin strongly medially produced; pygofers fairly robust, spiny along mesal margin, exceeded by the ovipositor. Male, last ventral segment concave posteriorly; valve large, longer than last ventral segment and wide, closely appressed to plates; plates broad basally, then suddenly narrowing and tapering to acute upturned and black-tipped apices, margins with three or four spines on basal third; pygofers fairly long, but completely hidden by plates.

Internal male genitalia: Styles long, anterior portion slender and with straight margins, lateral margins broadly rounded after attachment to connective, the style then narrowing till just before a sharp tooth on the inner margin, after which it is of about the same width as before the tooth to the broad two-cornered apex, between which it is slightly concave distally; connective rather slender, cup-shaped; œdagus with a club-shaped dorsal process near the base which has an anterior process at about its middle, the main portion broad basally, then rapidly narrowed to the slender curving terminal portion, which is composed of two acutely-pointed terminal straps.

Distribution: Specimens are at hand from Douglas, Pottawatomie, Riley and Johnson counties. Probably occurs throughout the eastern part of the state.

Hosts: This species is very common on grape. Often it is nearly as injurious to its host plant as *comes.* It is also very common in leaves in winter and is attracted in numbers to lights in summer.

basalaris (Say).

Erythroneura ~~*rubroscuta* (Gill.)~~.

(Pl. 17, figs. 5-6.)

Tettigonia basalaris Say, Jl. Acad. Nat. Sci. Phila., iv, p. 344, 1825; Compl. Writ., ii, p. 260.

Erythroneura affinis Fh., Homop. N. Y. St. Cab., p. 63, 1851.

Erythroneura basalaris Walsh, Proc. Bost. Soc. Nat. Hist., ix, p. 317, 1864.

Typhlocyba affinis Woodw., Psyche, v, p. 213, 1889.

Typhlocyba comes var. *basalaris* Gill., Proc. U. S. Natl. Mus., xx, p. 760, 1898.

Typhlocyba comes var. *basalaris* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 107, 1916.

Typhlocyba comes var. *basalaris* Van D., Cat. Hemip. N. A., p. 713, 1917.

Form: Like *comes* in size and structure.

Color: Yellowish, marked with blood brown. Vertex brownish, unicolorous, or marked with white median line and two white spots on either side. Pronotum brownish, the anterior portion marked with white spots. Scutellum with the basal angles darker than the tip. Elytra with the basal third brownish or reddish, posterior half with faint reddish oblique bands and with a black spot in the first apical cell. Face brownish, unicolorous, or marked with white median line or spots.

External genitalia: As in *comes,* except that leaving the pygofers at about the middle of their dorsal margin, are two long and sinuate processes whose acute tips considerably exceed the pygofers. These processes arise from the thickened and chitinized margin of the pygofers, these margins being thickest and giving off a slender branch that runs caudad into the pygofers, just before the large processes leave the pygofers. The corresponding processes in *comes* are U-shaped, and therefore these two species are not to be confused.

Internal male genitalia: Here, too, we see distinct differences from *comes.* The styles, while of the same general form, differ strongly apically, the upturned portion being much longer here, its sides running straight to the short anterior or upper tooth, and to the much longer lower one. The connective is much flatter than in *comes,* being very broadly V-shaped and lacking the distinct stem at the apex as in *comes.* The œdagus shows still greater differences. It curves broadly from the connective and sends up a short dorsal process after the middle, which curves caudad and then sends out an anterior and a pair of very slender latero-caudal processes. Then it continues on backward, terminating in a single, heavy, dorsally roughened and obtusely pointed process.

Distribution: While undoubtedly occurring throughout the eastern portion of the state, yet specimens have been recorded only from Douglas and Pottawatomie counties.

Hosts: This species is very common in Douglas county on wild gooseberry in the spring. In winter it is found hibernating in leaves.

Erythroneura rubroscuta (Gill.).

Typhlocyba rubroscuta Gill., Proc. U. S. Natl. Mus., xx, p. 755, 1898.
Erythroneura rubroscuta Van D., Cat. Hemip. N. A., p. 712, 1917.

Form: Length, 3.25 mm. Vertex about twice as long on middle as next the eye, one-half wider than long, rather acutely pointed. Pronotum about one-half longer than vertex, scarcely wider than head, less than twice as wide as long, lateral margins longer than the humeral margins, posterior margin clearly emarginate. Elytra long and narrow.

Color: Vertex pale yellow, tip and a basal spot near each eye usually reddish. Pronotum varying from yellow, tinged with red, to bright red with a large yellow median spot on anterior margin. Scutellum entirely red or with a median rectangular paler portion. Elytra pale yellow with broad red band just before tip of clavus which does not reach the costal margin, and with base of costal margin and cross nervures reddish. Face yellow, with reddish tinge.

External genitalia: Female, last ventral segment half longer than preceding, narrowed posteriorly, posterior margin with a large median lobe; pygofers narrow, slightly exceeded by the black-tipped ovipositor, with a few apical spines. Male, valve nearly as broad and fully as long as last ventral segment, posterior margin very slightly emarginate; plates over twice as long as the valve, lateral margins slightly concave medially, with a few bristles in the concavity, apices subacute, exceeding the short pygofers.

Distribution: This species has been taken only in Douglas and Pottawatomie counties.

Hosts: The writer swept one specimen from *Symphoricarpos orbiculatus.* Crevecoeur took many specimens hibernating in leaves.

Erythroneura illinoiensis (Gill.).

(Pl. 16, figs. 13-14.)

Typhlocyba illinoiensis Gill., Proc. U. S. Natl. Mus., xx, p. 758, 1898.
Typhlocyba illinoiensis Osb., 20th Rept. N. Y. St. Ent., p. 545, 1905.
Typhlocyba illinoiensis DeL., Tenn. St. Bd. Ent., Bul. 17, p. 109, 1916.
Erythroneura illinoiensis Van D., Cat. Hemip. N. A., p. 714, 1917.
Erythroneura illinoiensis Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 118, 1919.

Form: Long and slender, tapering at both ends. Length, 3 mm. Vertex nearly twice as long on middle as next the eye, about one-half wider than long. Pronotum long, scarcely twice as wide as long, anterior margin broadly convex, lateral margins long and widening posteriorly, humeral margins fused with slightly concave posterior margin. Elytra very long and narrow.

Color: Whitish or pale yellow. Vertex pale yellow with large red spot just back of apex. Pronotum with similar spot in the middle. Tip of scutellum with large red spot. Elytra whitish, irregularly marked with pale yellow or reddish spots and each with three large black spots, the largest one just laterad of the middle of the clavus, one near the middle of the costal margin, and one at the base of the inner apical cell. A red spot also on the mesopleuræ. Any or all of the red spots may be entirely absent or present only as yellowish spots.

External genitalia: About as in *comes*.

Internal male genitalia: Styles of the general form of the other members of the genus but with the broad apex distinctly convex between the two terminal teeth. Connective stout, broadly U-shaped; œdagus broad basally, with a small Y-shaped dorsally directed process at about its middle, and terminating apically in a large obtusely pointed process below which are two slender acutely pointed and terminally diverging strap-like processes.

Distribution: While undoubtedly occurring over a large portion of the eastern part of the state, the only specimens at hand are from Douglas county.

Hosts: This is a very common species in Douglas county on grape.

Erythroneura maculata (Gill.).

(Pl. 17, figs. 3-4.)

Typhlocyba comes var. *maculata* Gill., Proc. U. S. Natl. Mus., xx, p. 764, 1898.
Typhlocyba comes var. *maculata* Tuck., Kans. Univ. Sci. Bul., iv, p. 68, 1907.
Erythroneura comes var. *maculata* Van D., Cat. Hemip. N. A., p. 714, 1917.

Form: In size and structure like *comes*.

Color: Yellowish with bright red spots. Vertex with apical red spot and transverse band on disc which is curved strongly caudad medially. Pronotum with two broad red lateral lines and a broader, often Y-shaped median stripe. Scutellum with red lines on margins near the base and a large apical spot. Elytra with three spots on clavus, the first two often fused, five spots on corium forming a zigzag line, and the transverse veins, red. Face marked with red above.

External genitalia: As in *comes*. The chitinous process on the dorsal margin of the pygofers is, however, entirely different. It is not U-shaped as in *comes*, but consists of a long process which for most of its length is not in the pygofer, and which ends in two widely separated prominent teeth. This difference alone is enough to justify its separation from *comes*.

Internal male genitalia: Styles for the most part as in *comes*, but the terminal or upturned portion is much larger, the preapical tooth on the mesal margin being much further back. The terminal tooth is always long, sometimes very long, thus also differing from *comes*. The connective is V-shaped. The œdagus is entirely different to that of *comes*. It sends up a small dorsal process which has a small anteriorly directed portion, while the terminal part is a large obtusely pointed and roughened process, instead of being composed of two slender, curving, and acutely pointed processes as in *comes*. Viewed dorsally, the œdagus consists of a heavy portion terminating in three small lobes, the median one larger than the outer, and a terminal, more slender portion.

Distribution: Specimens of this species seem to have been taken only in Douglas and Riley counties. It is undoubtedly distributed over much of the eastern part of the state.

Hosts: The specific host is unknown, all of our specimens being taken when hibernating in leaves.

Erythroneura scutelleris (Gill.).

(Pl. 17, fig. 7.)

Typhlocyba comes var. *scutelleris* Gill., Proc. U. S. Natl. Mus., xx, p. 764, 1898.
Typhlocyba comes var. *scutelleris* Tuck., Kans. Univ. Sci. Bul., iv, p. 68, 1907.
Typhlocyba comes var. *scutelleris* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 108, 1916.
Erythroneura comes var. *scutelleris* Van D., Cat. Hemip. N. A., p. 714, 1917.

Form: Size and structure of *comes*.

Color: Most of our specimens are yellowish except that the posterior portion or most of the pronotum and all of the scutellum are dark brown. Occasionally the head too is washed with brown. The elytra are sometimes unmarked, and at times faintly marked with red as in *comes*. The black spots near the middle of the costal margin and just beyond the clavus are quite distinct and constant.

External genitalia: As in *comes* except for the chitinous process of the dorsal margin of the pygofers of the male. In this species the process is as in *maculata* but instead of ending in two rather short and widely separated teeth, it terminates in two long teeth which are close together, the dorsal one being slightly but distinctly longer than the ventral.

Internal male genitalia: Practically as in *maculata* except that the small dorsal process of the œdagus has two small but distinct lateral processes.

Distribution: Specimens are at hand from Douglas county. It surely occurs in many more counties of the eastern part of the state.

Hosts: Its definite host is unknown. DeLong reports beating it from grape and honey locust. It is also very common at lights.

Erythroneura crevecœuri (Gill.).

Typhlocyba crevecœuri Gill., Proc. U. S. Natl. Mus., xx, p. 767, 1898.
Erythroneura crevecœuri Van D., Cat. Hemip. N. A., p. 716, 1917.

Form: Length, 3 to 3.5 mm. Vertex nearly twice as long on the middle as next the eye, one-half wider than long, obtusely angled apically. Pronotum one-half longer than the vertex, widest at the lateral angles, lateral margins long, humeral margins shorter, posterior margin slightly emarginate. Elytra long and narrow.

Color: Vertex and pronotum yellow, with two broad longitudinal red lines which sometimes widen enough to cover the vertex. Scutellum entirely red or blackish. Elytra red up to tip of clavus, yellow beyond except for reddish veins, the base of costal margin more or less yellow. Middle portion of reddish area usually smoky in color. Face and beneath yellow, marked with reddish.

External genitalia: Female, last ventral segment long, narrowing posteriorly, posterior margin with a prominent median lobe; pygofers robust, slightly exceeded by the black-tipped ovipositor, very sparsely spined. Male, valve broad, as long or longer than last ventral segment, posterior margin truncate or slightly emarginate; plates about twice as long as valve, lateral margins concave near middle and spined in the concavity, subacute apices exceeding the pygofers.

Distribution: Our specimens were taken in Douglas and Pottawatomie counties.

Hosts: The writer has taken specimens of this species from grape. It is also found hibernating in leaves.

Erythroneura comes (Say.).

(Pl. 17, figs. 1-2.)

Tettigonia comes Say, Jl. Acad. Nat. Sci. Phila., iv, p. 343, 1825; Compl. Writ., ii, p. 259.
Typhlocyba comes Woodw., Psyche. v, p. 213, 1889.
Typhlocyba comes G. & B., Hemip. Colo., p. 111, 1895.
Typhlocyba comes Gill., Proc. U. S. Natl. Mus., xx, p. 759, 1898.
Typhlocyba comes Sling., Corn. Univ. Exp. Sta., Bul. 215, 1904.
Typhlocyba comes Smith, Rept. N. J. Agr. Col. Exp. Sta., p. 651, 1904.
Typhlocyba comes Quaint., U. S. Dept. Agr., Farmer's Bul. 284, p. 19, 1907.
Typhlocyba comes Quayle, Calif. Agr. Exp. Sta., Bul. 192, p. 111, 1907.
Typhlocyba comes Quayle, Jl. Ec. Ent., i, p. 182, 1908.
Typhlocyba comes Quayle, Calif. Agr. Exp. Sta., Bul. 198, 1908.
Typhlocyba comes Hartz., N. Y. Agr. Exp. Sta., Bul. 331, p. 568, 1910.
Typhlocyba comes Johns., U. S. Dept. Agr., Bur. Ent., Bul. 97, pt. i, 1911.
Typhlocyba comes Hartz., N. Y. Agr. Exp. Sta., Bul. 344, 1912.
Typhlocyba comes Sand., Ins. Pests of Farm, Garden and Orchard, p. 520, 1912.
Typhlocyba comes O'Kane, Inj. Ins., p. 311, 1912.
Typhlocyba comes Johns., U. S. Dept. Agr., Bur. Ent., Bul. 116, pt. i, 1912.
Typhlocyba comes Johns., U. S. Dept. Agr., Bur. Ent., Bul. 19, 1914.
Typhlocyba comes Osb., Me. Agr. Exp. Sta., Bul. 238, p. 156, 1915.
Typhlocyba comes Ess., Inj. Benef. Ins. Calif., edn. 2, p. 64, 1915.
Typhlocyba comes DeL., Tenn. St. Bd. Ent., Bul. 17, p. 106, 1916.
Erythroneura comes Van D., Cat. Hemip. N. A., p. 712, 1917.
Erythroneura comes Fent., Ohio Jl. Sci., xviii, p. 186, 1918.
Erythroneura comes Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 114, 1919.

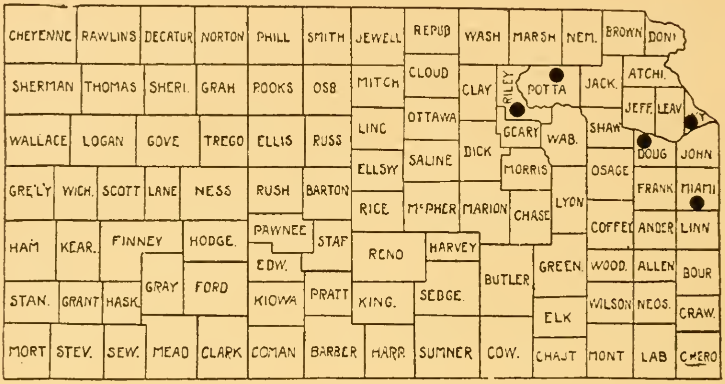
Form: Length, 2.75 to 3 mm. Vertex over one-half longer at middle than next the eye, nearly one-half longer than wide. Pronotum twice as wide as long, anterior margin strongly convex, lateral margins long and gradually widening posteriorly, humeral margins indistinct, fusing with slightly concave posterior margin. Elytra long and narrow.

Color: Pale yellow. Vertex with two longitudinal red lines, often meeting apically, thus forming an inverted V. Pronotum with two lateral lines and a median Y-shaped line, red. Basal angles of scutellum red. Elytra marked with red, clavus with red band along claval suture, widened at base and extending to the elytral suture at about the middle of the clavus, also a red spot at tip of clavus; corium with a long red line, narrow basally, then suddenly widening and reaching to claval suture and again reaching toward apical claval spot, finally ending in the red transverse nervures, laterally reaching to costal black spot at about the middle of costal margin, with a black spot on inner margin just beyond tip of clavus and another, often lacking, in second apical cell, the apical portion of the elytra often smoky. The above markings all vary greatly in intensity, being light in the summer and becoming brighter and darker in the fall and winter.

External genitalia: Female, last ventral segment large, triangular, posterior margin strongly produced medially, slightly concave on either side of the obtuse apex; pygofers moderately robust, with a row of spines on either side of the usually black-tipped ovipositor which slightly exceeds the pygofers. Male, valve large, broad, posterior margin truncate or slightly concave; plates wide basally, suddenly narrowed and spiny at basal third, then gradually narrowed to upturned and usually black tips which slightly exceed the pygofers. The latter bear a U-shaped chitinous process on the dorsal margin near the apex, of which the lower tooth is the larger.

Internal male genitalia: Styles long, with long anterior portion nearly parallel-margined, a lateral constriction opposite swollen place of attachment to connective, then widening laterally to widest point, again narrowing and then slightly widened just before lateral preapical incision, tips turned outward, ending in two acute points, the outer the larger, between which the end is slightly concave, and with a large tooth on the mesal margin a short distance back of the apex; connective V-shaped, stout, the apex with a distinct dorsally directed portion; œdagus sending up an anterior process a short distance from the base, which expands dorsally and shows, when viewed dorsally, an anterior tooth and two pairs of lateral processes, the anterior ones more slender and more acute than the shorter but much stouter posterior pair, the apex quite obtuse. Then the main or posterior part curves dorsad and divides into two slender and acute processes, the tips of which are seen one on either side of the bifid apex of the anterior process.

Distribution: Occurs throughout the state where wild or cultivated grapes are found. The following map shows where specimens have been taken:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI.
JEFF.
LEAV
WY.
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DICK
SALINE
DOUG
JOHN
ELLSW
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
FRANK
MIAMI
RICE
McPHER
MARION
CHASE
LYON
HAM
KEAR.
FINNEY
HODGE.
PAWNEE
STAF
COFFEE
ANDER
LINN
RENO
HARVEY
EDW.
GREEN.
WOOD.
ALLEN
BOUR
BUTLER
STAN.
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
ELK
WILSON
NEOS.
CRAW.
MORT
STEV.
SEW.
MEAD
CLARK
COMAN
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT
LAB
CHERO

Hosts: The nymphs seem to be confined to the grape. On this host it is of great economic importance, as shown by the bulletins listed in the above bibliography. The adults, however, are known to feed on almost any host that happens to be convenient. It is frequently found on various trees, grasses, and shrubs, though the grape is the favorite plant.

Erythroneura comes var. *ziczac* Walsh.

Erythroneura ziczac Walsh, Proc. Bost. Soc. Nat. Hist., ix, p. 317, 1864.
Typhlocyba ziczac Woodw., Psyche, v, p. 214, 1889.
Typhlocyba comes var. *ziczac* Gill., Proc. U. S. Natl. Mus., xx, p. 761, 1898.
Typhlocyba comes var. *ziczac* Osb., Me. Agr. Exp. Sta., Bul. 238, p. 156, 1915.
Typhlocyba comes var. *ziczac* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 107, 1916.
Erythroneura comes var. *ziczac* Van D., Cat. Hemip. N. A., p. 713, 1917.
Erythroneura comes var. *ziczac* Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 116, 1919.

Form: Like *comes* in size and structure.

Color: Pale yellow, marked with red and reddish-brown. Vertex with two reddish longitudinal lines. Pronotum with lateral margins and a Y on disc reddish or blood-brown. Scutellum with basal angles and tip blood-brown. Elytra with a zigzag blood-brown line on basal half of clavus, then to black spot at about middle of costal margin, from there to dark spot just beyond apex of clavus, and then as a smoky band nearly reaching black spot near tip of wing, the edges of this line and the spots on tip of clavus sometimes red, as in *comes*.

External genitalia: As in *comes*.

Internal male genitalia: There seem to be slight differences between the œdagus of this and typical *comes*, but seemingly not enough to make it a distinct species.

Distribution: Should occur throughout the eastern portion of the state wherever its host occurs. Specimens are at hand from Douglas county.

Hosts: Our specimens were all taken from *Ampelopsis quinquefolia.* Gillette records it as sometimes occurring on grape.

Erythroneura comes var. *vitis* (Harr.).

Tettigonia vitis Harr., Encyc. Am., viii, p. 43, 1831.
Erythroneura vitis Fh., Homop. N. Y. St. Cab., p. 63, 1851.
Erythroneura vitis Saund., Ins. Inj. to Fruits, p. 286, fig. 297, 1883.
Typhlocyba vitis Woodw., Psyche, v, p. 213, 1889.
Typhlocyba comes var. *vitis* Gill., Proc. U. S. Nat. Mus., xx, p. 761, 1898.
Typhlocyba comes *var. vitis* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 107, 1916.
Erythroneura comes var. *vitis* Van D., Cat. Hemip. N. A., p. 713, 1917.

Form: Like typical *comes* in size and structure.

Color: Head yellow, vertex sometimes marked with reddish lines or the base reddish. Pronotum with anterior portion yellowish, remainder reddish or blood-brown, the lateral margins often brighter. Base of elytra reddish, followed by a yellow transverse bar, back of which is a large red spot which reaches the black spots on the costal margin, the interior of this spot often being brownish-red. Back of this spot is another yellow transverse band which reaches just beyond the red transverse veins. The apex of the elytra is smoky with a black spot in the second apical cell.

External genitalia: As in typical *comes.*

Internal male genitalia: Very much as in typical *comes.* The œdagus, however, seems to show some differences, which, should further study reveal as constant, would justify us in advancing this variety to specific rank.

Distribution: Specimens of this variety have been taken in Douglas, Pottawatomie and Riley counties. It of course has a larger distribution in the state than this indicates. .

Hosts: Our specimens were taken on grape.

Erythroneura comes var. *infuscata* (Gill.).

Typhlocyba comes var. *infuscata* Gill., Proc. U. S. Natl. Mus., xx, p. 764, 1898.
Typhlocyba comes var. *infuscata* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 108, 1916.
Erythroneura comes var. *infuscata* Van D., Cat. Hemip. N. A., p. 714, 1917.
Erythroneura comes var. *infuscata* Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 116, 1919.

Form: In size and structure like typical *comes*

Color: Yellowish. With a dark blood-brown band starting at apex of vertex, gradually widening on head and pronotum, and forming zigzag bands on the elytra. Most of costal margin of elytra yellow, and on each elytron are three yellow spots around the reddish tip of the clavus.

External genitalia: As in typical *comes.*

Internal male genitalia: The terminal tooth of the styles seems to be distinctly longer than in typical *comes.* Should this prove to be constant, this variety ought to be recognized as a distinct species. At present, however, we do not have enough material at hand to enable us to determine this point.

Distribution: There are specimens in the Snow collection from Douglas county and from Kansas City, Mo.

Hosts: Unknown.

Erythroneura comes var. *coloradensis* (Gill.).

Typhlocyba vitifex var. *coloradensis* Gill., Colo. Agr. Exp. Sta., Bul. 19, p. 16, 1892.
Typhlocyba vitifex var. *coloradensis* G. & B., Hemip. Colo., p. 113, 1895.
Typhlocyba coloradensis Cock., N. M. Agr. Exp. Sta., Bul. 19, p. 114, 1896.
Typhlocyba comes var. *coloradensis* Gill., Proc. U. S. Natl. Mus., xx, p. 763, 1898.
Typhlocyba comes var. *coloradensis* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 108, 1916.
Erythroneura comes var. *coloradensis* Van D., Cat. Hemip. N. A., p. 714, 1917.

Form: In size and structure like typical *comes.*

Color: Yellowish. Vertex with large red spot or unmarked. Pronotum with red lines on lateral margins and a V-shaped mark on middle or unmarked. Scutellum with two large black basal spots, the anterior portion showing through the pronotum. Elytra marked much as in typical *comes*, though the markings on the corium are usually less distinct. The three black spots of the elytra are usually very distinct. Tip of ovipositor black.

External genitalia: As in typical *comes*

Internal male genitalia: These show some fairly distinct differences from those of typical *comes* yet in many respects they are so alike that it does not now seem wise to give this variety specific rank. The styles seem to be more slender, especially the part just before the broadly expanded apex. The œdagus seems to lack the terminal process of the dorsal expansion of the anterior process.

Distribution: Specimens are at hand from Douglas and Sedgwick counties. It undoubtedly occurs throughout the eastern part of the state.

Hosts: Our specimens were taken on grape.

Erythroneura obliqua (Say).

(Pl. 17, figs. 10-11.)

Tettigonia obliqua Say, Jl. Acad. Nat. Sci. Phila., iv, p. 342, 1825; Compl. Writ., ii, p. 259.
Erythroneura obliqua Fh., Homop. N. Y. St. Cab., p. 63, 1851.
Typhlocyba obliqua Woodw., Psyche, v, p. 213, 1889.
Typhlocyba obliqua G. & B., Hemip. Colo., p. 112, 1895.
Typhlocyba obliqua Gill., Proc. U. S. Natl. Mus., xx, p. 756, 1898.
Typhlocyba obliqua Osb., 20th Rept. N. Y. St. Ent., p. 545, 1905.
Typhlocyba obliqua Osb., Me. Agr. Exp. Sta., Bul. 238, p. 155, 1915.
Typhlocyba obliqua DeL., Tenn. St. Bd. Ent., Bul. 17, p. 105, 1916.
Erythroneura obliqua Van D., Cat. Hemip. N. A., p. 714, 1917.
Erythroneura obliqua Fent., Ohio Jl. Sci., xviii, p. 186, 1918.
Erythroneura obliqua Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 117, 1919.

Form: Length, 3 mm. Vertex one-half longer on middle than next the eye, one-half wider than long. Pronotum twice as wide as long, anterior margin strongly convex, lateral margins moderately long and widening posteriorly. Elytra long and narrow.

Color: Vertex, pronotum, and scutellum pale yellowish, elytra whitish. Vertex with two broad red lines which meet at the apex and then extend back across the pronotum. Scutellum red except for yellow median line on basal half. Elytra with oblique reddish or orange lines on clavus and on disc, and with the basal portion of costal margin red. Face marked irregularly with reddish which sometimes covers the front and the clypeus.

External genitalia: Female, last ventral segment long, produced posteriorly into a large obtuse median lobe, on either side of which the margins are distinctly concave; pygofers robust, slightly exceeded by the black-tipped ovipositor. Male, valve large, quadrate, posterior margin slightly concave; plates broad basally, margins suddenly narrowed near base and spiny at this point, apices upturned and acute.

Internal male genitalia: Styles large, widest at point of attachment to connective and just before upturned apex, between which it is slightly narrowed, the terminal claw very characteristic, being large, curving, and pointed mesad; connective V-shaped, its arms about of equal thickness throughout; œdagus, when viewed laterally, with long anterior arm to connective, a pair of delicate ventral processes, a stout but tapering median process and a large dorsal process of which the anterior two-thirds projects cephalad.

Distribution: Specimens are at hand from Cherokee, Douglas, and Pottawatomie counties. It probably occurs throughout the eastern portion of the state.

Hosts: Found very commonly on grape and hibernating in leaves.

Erythroneura obliqua var. *nœvus* (Gill.).

Typhlocyba obliqua var. *nœvus* Gill., Proc. U. S. Natl. Mus., xx, p. 757, 1898.
Typhlocyba obliqua var. *nœvus* Tuck., Kans. Univ. Sci. Bul., iv, p. 68, 1907.
Typhlocyba obliqua var. *nœvus* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 105, 1916.
Erythroneura obliqua var. *nœvus* Van D., Cat. Hemip. N. A., p. 715, 1917.

Form: In size and structure like typical *obliqua.*

Color: Just like typical *obliqua* except that the scutellum has the basal angles black or is entirely black, and the pronotum often has the posterior margin darkened.

External genitalia: As in typical *obliqua.*

Internal male genitalia: Agree in every particular with typical *obliqua.*

Distribution: Specimens are at hand from Douglas and Pottawatomie counties.

Hosts: Usually taken on grapevines.

Erythroneura dorsalis (Gill.).

(Pl. 17, fig. 14.)

Typhlocyba obliqua var. *dorsalis* Gill., Proc. U. S. Natl. Mus., xx, p. 757, 1898.

Typhlocyba obliqua var. *dorsalis* Van D., Trans. San Diego Soc. Nat. Hist., ii. p. 57, 1914.

Typhlocyba obliqua var. *dorsalis* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 105, 1916.

Erythroneura obliqua var. *dorsalis* Van D., Cat. Hemip. N. A., p. 715, 1917.

Erythroneura obliqua var. *dorsalis* Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 118, 1919.

Form: Length, 3 mm. Like *obliqua* except that vertex seems to be proportionally longer.

Color: Yellowish or whitish, with a broad dark red stripe running the length of the insect to the smoky apical cells of the elytra. In addition the costal margin of the wing, especially basally, is reddish, and there are one or two dark spots before the transverse veins, just outside of the red discal stripe. The face is red except for two broad white stripes just below the margin of the vertex and whitish spots on the loræ.

External genitalia: As in *obliqua*.

Internal male genitalia: Styles as in *obliqua* except apically where they are entirely different, for instead of having one long curving apical tooth, there are two much shorter and practically straight ones; connective V-shaped and as in *obliqua;* œdagus very different from that of the latter for the dorsal process is very much smaller, the main terminal process is more slender, and has two apical and curving lateral processes, and in addition the base of the œdagus bears a pair of very large and conspicuous horn-like processes which extend laterad. The pair of small ventral processes are present as in *obliqua*.

Distribution: The only specimens at hand are from Douglas county.

Hosts: Grape seems to be the common host of this species.

The very clear differences in the tips of the styles and in the whole structure of the œdagus, show clearly that this cannot possibly be a variety of *obliqua*. Its genitalia are very characteristic and seem to be very constant, the specimens dissected agreeing in every particular, as did those of typical *obliqua* among themselves.

Erythroneura fumida (Gill.).

(Pl. 17, figs. 8-9.)

Typhlocyba obliqua var. *fumida* Gill., Proc. U. S. Natl. Mus., xx, p. 758, 1898.

Erythroneura obliqua var. *fumida* Van D., Trans. San Diego Soc. Nat. Hist., ii, p. 57, 1914.

Typhlocyba obliqua var. *fumida* DeL., Tenn. St. Bd. Ent., Bul. 17, p. 105, 1916.

Erythroneura obliqua var. *fumida* Van D., Cat. Hemip. N. A., p. 715, 1917.

Form: Length, 3 mm. Like *obliqua*, except that vertex seems relatively shorter.

Color: Yellowish, but smoky throughout. Vertex and pronotum unmarked or with the red bands as in *obliqua.* Elytra marked as in *obliqua,* though faintly, or the reddish coloration evenly diffused over the anterior two-thirds.

External genitalia: As in typical *obliqua.*

Internal male genitalia: Very different from that of typical *obliqua.* Syles very broad just before the very characteristic slender terminal tooth; connective V-shaped; œdagus with an anterior dorsal process which expands horizontally and a very large and stout terminal process which terminates in two small lateral teeth.

Distribution: Specimens are at hand from Douglas and Pottawatomie counties.

Hosts: The writer has taken this species by the hundreds from wild gooseberry in the spring. It is also reported from grape.

The very characteristic styles, and especially the œdagus, show such great differences from the corresponding organs in typical *obliqua,* that it is certain that the two forms cannot belong to the same species. Accordingly this variety is here given specific rank.

Erythroneura vulnerata Fh.

(Pl. 17, figs. 12-13.)

Erythroneura vulnerata Fh., Homop. N. Y. St. Cab., p. 62, 1851.
Typhlocyba vulnerata Woodw., Psyche, v, p. 213, 1889.
Typhlocyba vulnerata G. & B., Hemip. Colo., p. 113, 1895.
Typhlocyba vulnerata Gill., Proc. U. S. Natl. Mus., xx. p. 764, 1898.
Typhlocyba vulnerata Osb., 20th Rept. N. Y. St. Ent., p. 545, 1905.
Typhlocyba vulnerata Osb., Me. Agr. Exp. Sta., Bul. 238, p. 156, 1915.
Typhlocyba vulnerata DeL., Tenn. St. Bd. Ent., Bul. 17, p. 110, 1916.
Erythroneura vulnerata Van D.. Cat. Hemip. N. A.. p. 715. 1917.
Erythroneura vulnerata Fent., Ohio Jl. Sci., p. 186, 1918.
Erythroneura vulnerata Lathr., S. C. Agr. Exp. Sta., Bul. 199, p. 114, 1919.

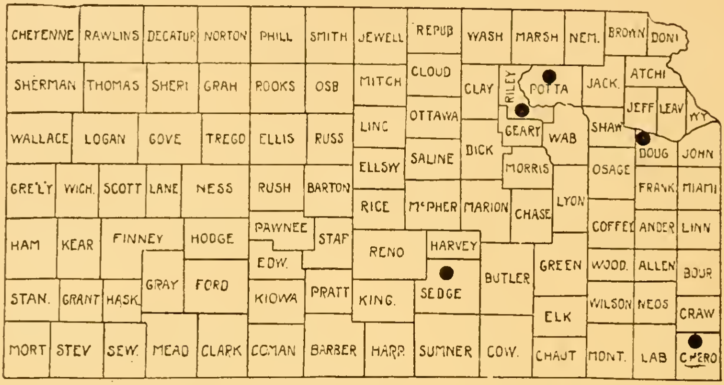
Form: Length, 2.5 to 3 mm. Vertex nearly twice as long on middle as next the eye, over one-half wider than long. Pronotum long, scarcely twice as wide as long, anterior margin strongly convex, posterior margin slightly concave. Elytra moderately long.

Color: Whitish, marked with reddish or brownish. Vertex, pronotum, and scutellum dull reddish, but with distinct white median line and lateral white lines or spots on the vertex and pronotum. Elytra whitish, strongly marked with red on clavus and corium, the costal margin in the main white, the apex strongly smoky.

External genitalia: Practically like *obliqua,* though the plates of the male seem usually to be more produced and acute apically.

Internal male genitalia: Styles of about the form characteristic of the tribe, the terminal upturned portion long, posterior terminal tooth long, anterior one very short; connective V-shaped; œdagus widening posteriorly into a very broad, three-pointed organ, the lateral points longer than the middle one, also with a small dorsal process extending backward from before the apex.

Distribution: Found in the eastern part of the state, as shown by the following map: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CRAW
MORT
STEV
SEW.
MEAD
CLARK
COMAN
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB
CHERO

Hosts: Gillette gives Virginia creeper, grape and *Clematis* as hosts for this species.

Erythroneura nigra (Gill.).

(Pl. 17, fig. 15.)

Typhlocyba vulnerata var. *niger* Gill., Proc. U. S. Natl. Mus., xx, p. 765, 1898.
Erythroneura vulnerata var. *nigra* Van D., Cat. Hemip. N. A., p. 716, 1917.

Form: Length, 2.5 to 2.75 mm. Vertex over one-half longer on middle than next the eye, one-half wider than long. Pronotum long, less than twice as wide as long. Elytra moderately long.

Color: Black or dark brown above, marked with white. Vertex with median line and a pair of short lateral lines, white. Pronotum with short white median line on anterior part, usually a pair of lateral spots, and sometimes several white spots along anterior margin. Elytra with large white spot just back of the scutellum, tip of clavus and transverse veins usually light and broad, the white costal band on posterior two-thirds interrupted near the middle and apically. Face pale yellow.

External genitalia: As in *vulnerata.*

Internal male genitalia: Styles with long apical portion, posterior tooth longer than anterior; connective V-shaped; œdagus dividing apically into an anterior and a posterior process, the latter ending in an obtuse apex with a dorsal and two ventral small processes.

Distribution: Specimens of this species have been taken in Cherokee, Douglas, Pottawatomie, and Hodgeman counties.

Hosts: Unknown, probably grape.

The great differences between the œdagus of this species and *vulnerata* preclude the possibility of their belonging to the same species.

Explanation of Plates.

PLATE II.

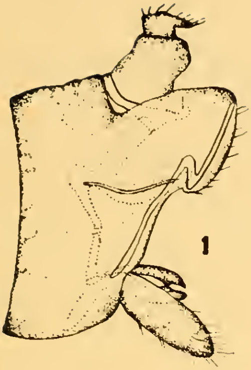
Agalliopsis novella—
1. Lateral view.
2. Caudal view.
3. Anal tube collar.
4. Style.

Agallia 4-punctata—
5. Lateral view.
6. Dorsal view of connective and styles.

Agallia constricta—
7. Lateral view.
8. Ventral view of connective and œdagus.
9. Ventral view of style.
10. Anal tube collar.

Aceratagallia cinerea—
11. Lateral view.
12. Ventral view of style.
13. Ventral view of connective and œdagus.

PLATE II.



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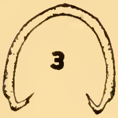

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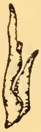

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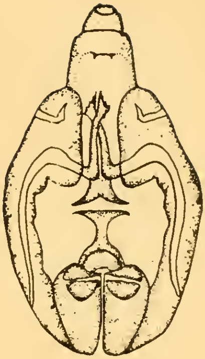

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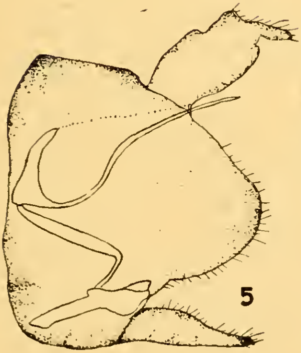

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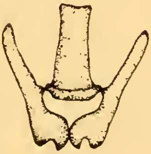

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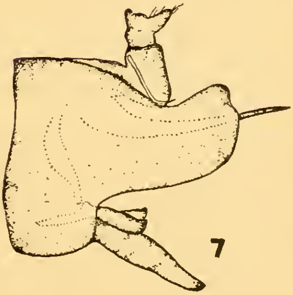

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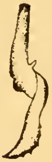

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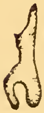

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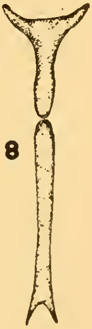

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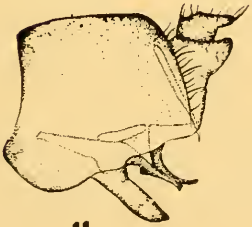

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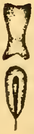

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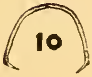

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PLATE III.

Aceratagallia uhleri—

1. Lateral view.
2. Ventral view of style, connective and œdagus.
3. Dorsal view of styles, connective and œdagus.
4. Anal tube collar.

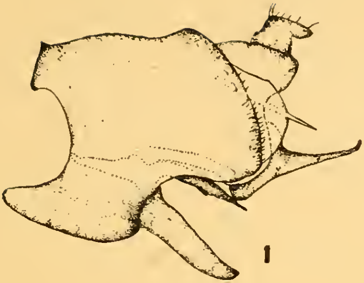
Aceratagallia sanguinolenta—

5. Lateral view.
6. Dorsal view of styles, connective and œdagus.
7. Ventral view of a style.
8. Anal tube collar.

Idiocerus snowi—

9. Lateral view.
10. Anal tube collar.
11. Ventral view of style, connective and œdagus.

PLATE III.



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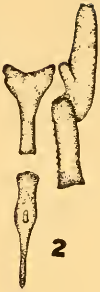

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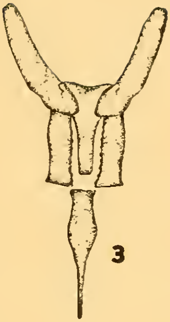

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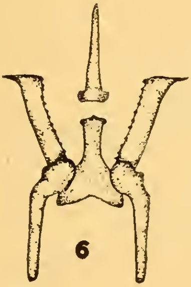

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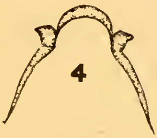

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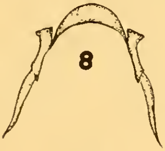

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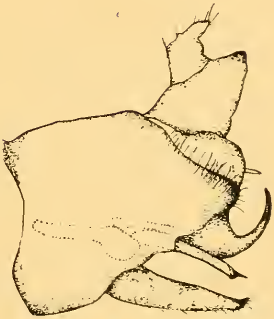

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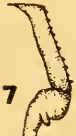

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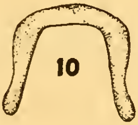

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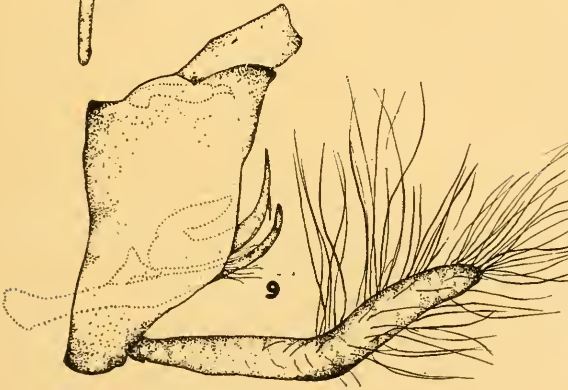

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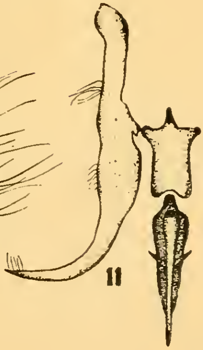

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PLATE IV.

Idiocerus pallidus—

1. Lateral view.
2. Ventral view of style, connective and œdagus.
3. Anal tube collar.

Idiocerus verticis—

4. Lateral view.
5. Ventral view of style and connective.
6. Anal tube collar.

Idiocerus nervatus—

7. Lateral view.
8. Ventral view of style, connective and œdagus.
9. Anal tube collar.

PLATE IV.

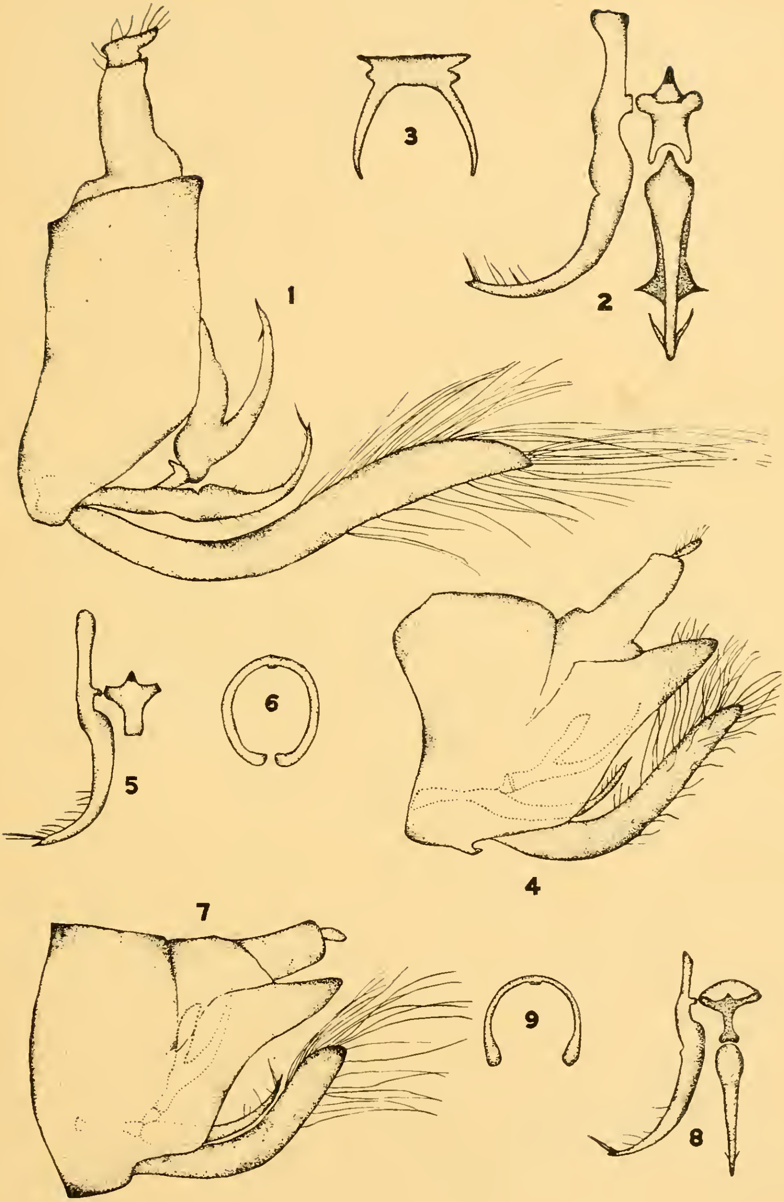

PLATE V.

Bythoscopus apicalis—

1. Lateral view.
2. Ventral view of plates and part of connective.
3. Ventral view of œdagus.
4. Remainder of connective.

Oncopsis distinctus—

5. Lateral view.
6. Ventral view of styles, connective and œdagus.

Macropsis virdis—

7. Lateral view.
8. Ventral view of styles, connective and œdagus.
9. Anal tube collar.

PLATE V.

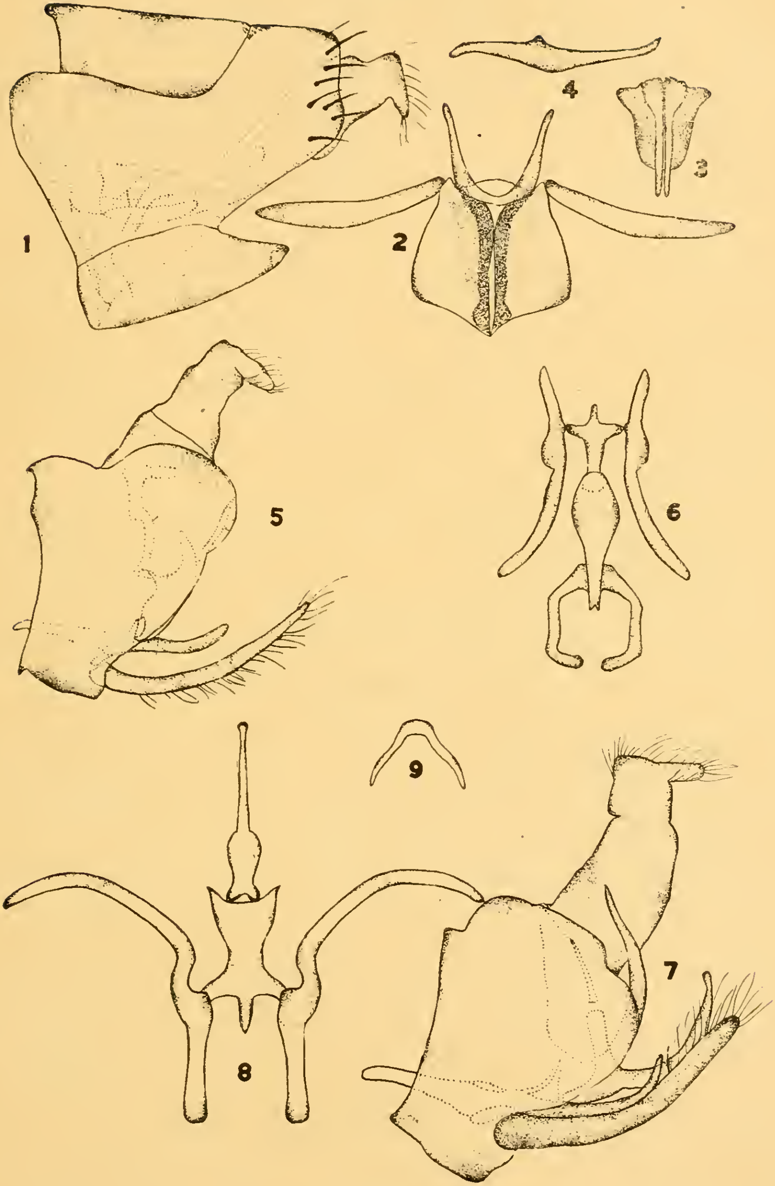

PLATE VI.

Aulacizes irrorata—

1. Lateral view.
2. Styles and connective.
3. Caudal view of œdagus.

Homalodisca triquetra—

4. Lateral view.
5. Caudal view of œdagus.
6. Dorsal view of styles and connective.

PLATE VI.

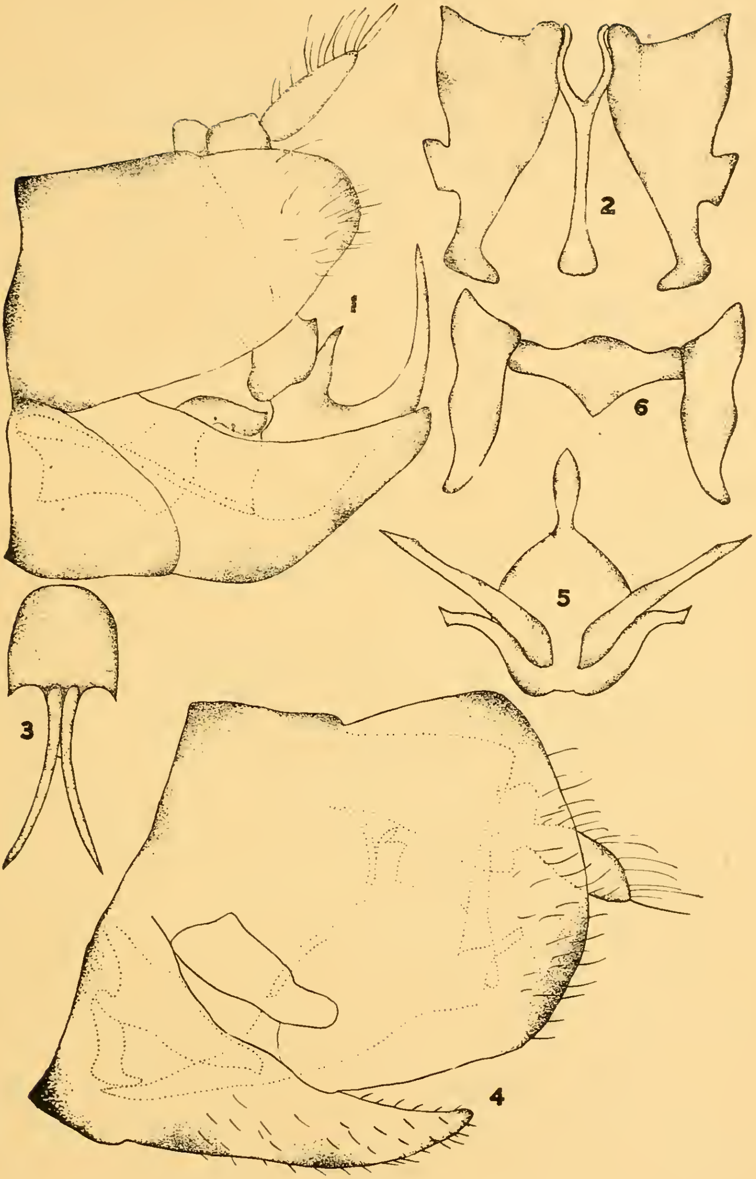

PLATE VII.

Oncometopia undata—
1. Lateral view.
2. Dorsal view of styles and connective.
3. Plate, showing chitinized style attachment.

Kolla bifida—
4. Lateral view.
5. Ventral view of style, connective and œdagus.

Kolla hartii—
6. Lateral view.
7. Ventral view of style, connective and œdagus.

PLATE VII.

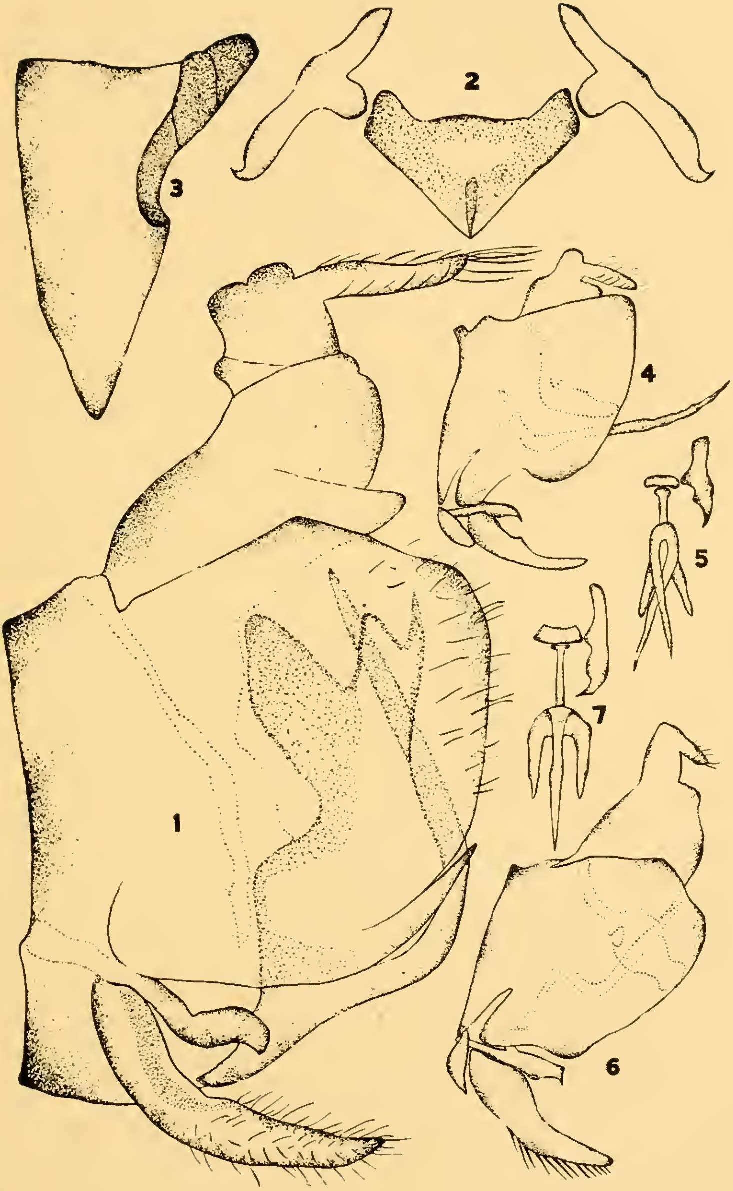

PLATE VIII.

Oncometopia lateralis—

1. Lateral view.
2. Styles and connective.

Graphocephala coccinea—

3. Lateral view.
4. Ventral view of styles, connective and œdagus.

Kolla geometrica—

5. Lateral view.
6. Ventral view of style, connective and œdagus.

PLATE VIII.

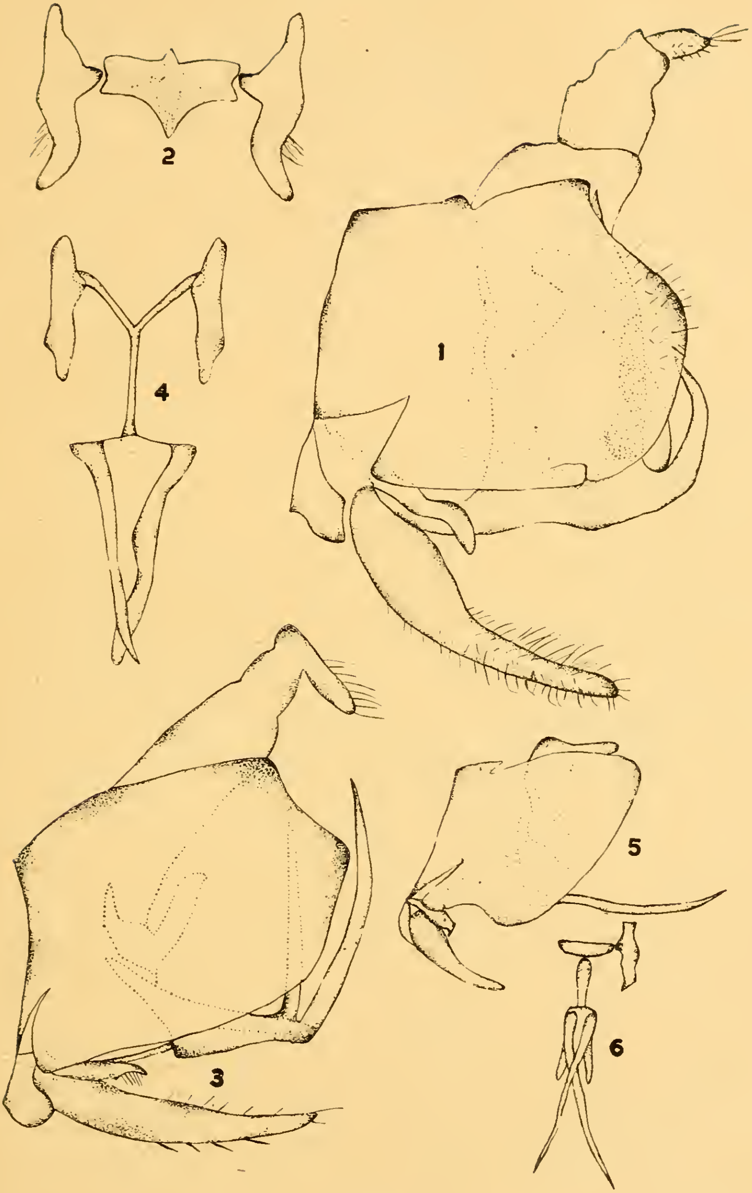

PLATE IX.

Cicadella hieroglyphica—
1. Lateral view.
2. Styles and connective.
3. Ventral view of œdagus.

Cicadella atropunctata—
4. Lateral view.
5. Ventral view of style, connective and œdagus.

Dræculacephala mollipes—
6. Lateral view.
7. Ventral view of styles, connective and œdagus.

Dræculacephala reticulata—
8. Lateral view.
9. Ventral view of styles, connective and œdagus.

PLATE IX.

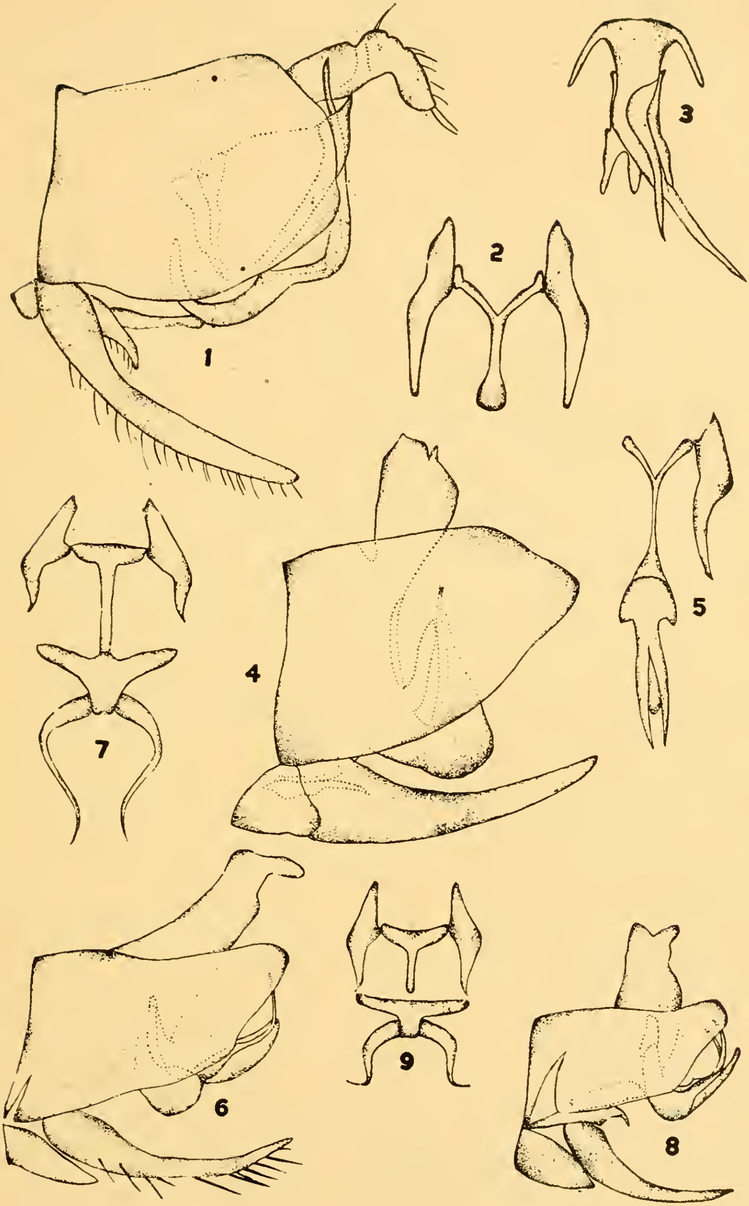

PLATE X.

Gypona 8-lineata—
1. Lateral view.
2. Ventral view of styles, connective and œdagus.

Helochara communis—
3. Lateral view.
4. Ventral view of styles, connective and œdagus.

Xerophlœa viridis—
5. Lateral view.
6. Ventral view of styles, connective and œdagus.

PLATE X.

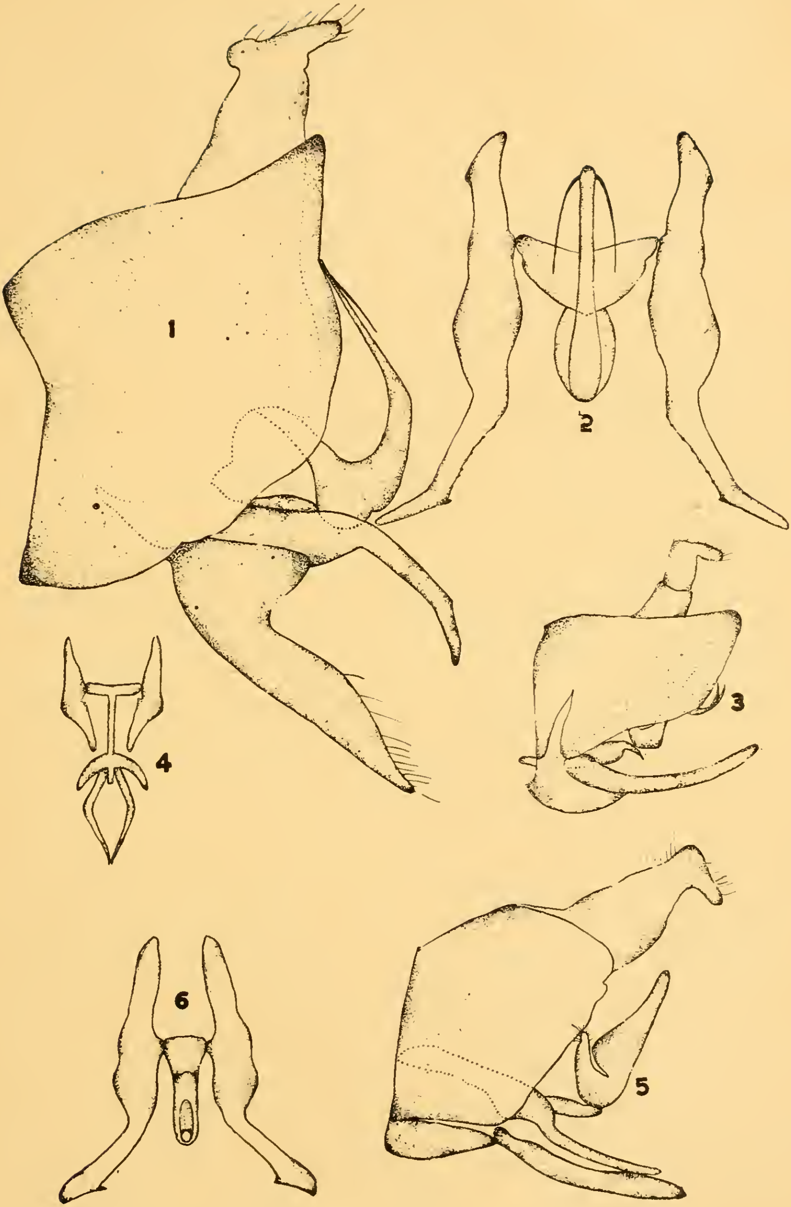

PLATE XI.

Scaphoideus immistus—

1. Lateral view.
2. Dorsal view of style, connective and œdagus.

Platymetopius cinereus—

3. Lateral view.
4. Style and connective.

Platymetopius acutus—

5. Lateral view.
6. Style and connective, latter without one terminal process.
7. Ventral view of œdagus.

Platymetopius frontalis—

8. Lateral view.
9. Styles and connective.

PLATE XI.

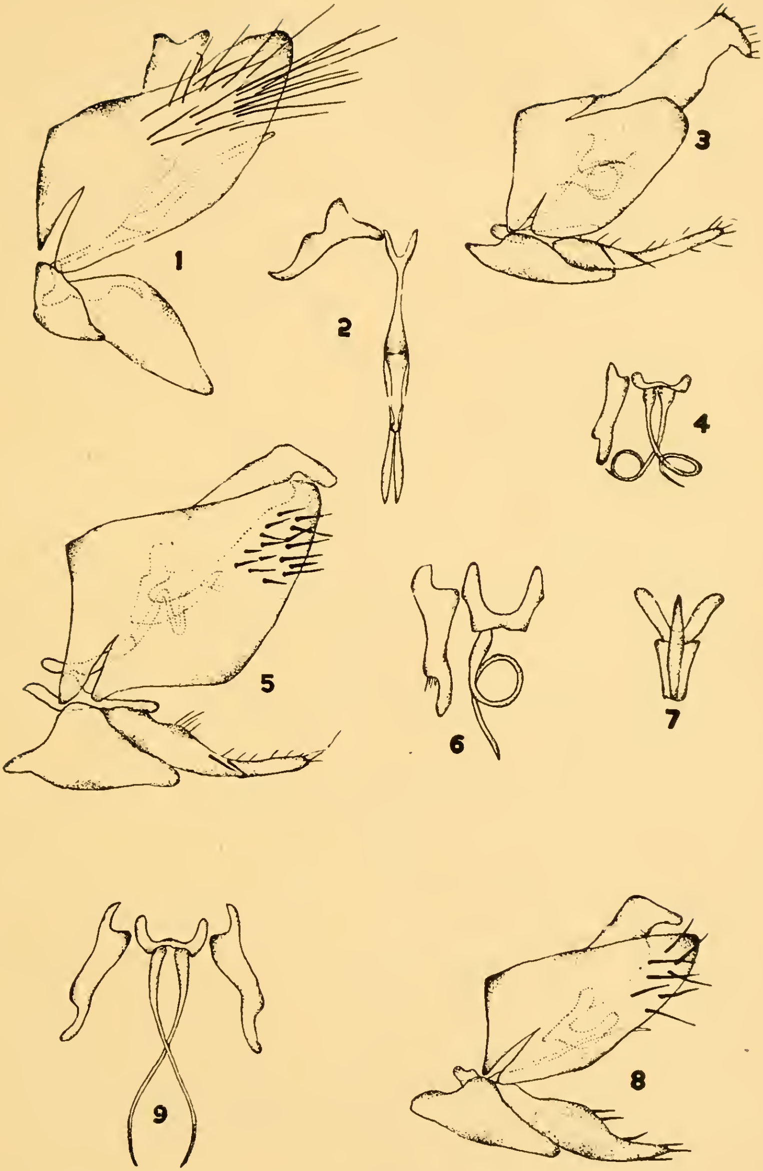

PLATE XII.

Deltocephalus inimicus—

1. Lateral view.
2. Dorsal view of style, connective and œdagus.

Deltocephalus flavicosta—

3. Lateral view.
4. Dorsal view of style, connective and œdagus.

Deltocephalus affinis—

5. Lateral view.
6. Dorsal view of style, connective and œdagus.

Deltocephalus sayi—

7. Lateral view.
8. Dorsal view of style, connective and œdagus.

Euscelis exitiosus—

9. Lateral view.
10. Dorsal view of style, connective and œdagus.

PLATE XII.

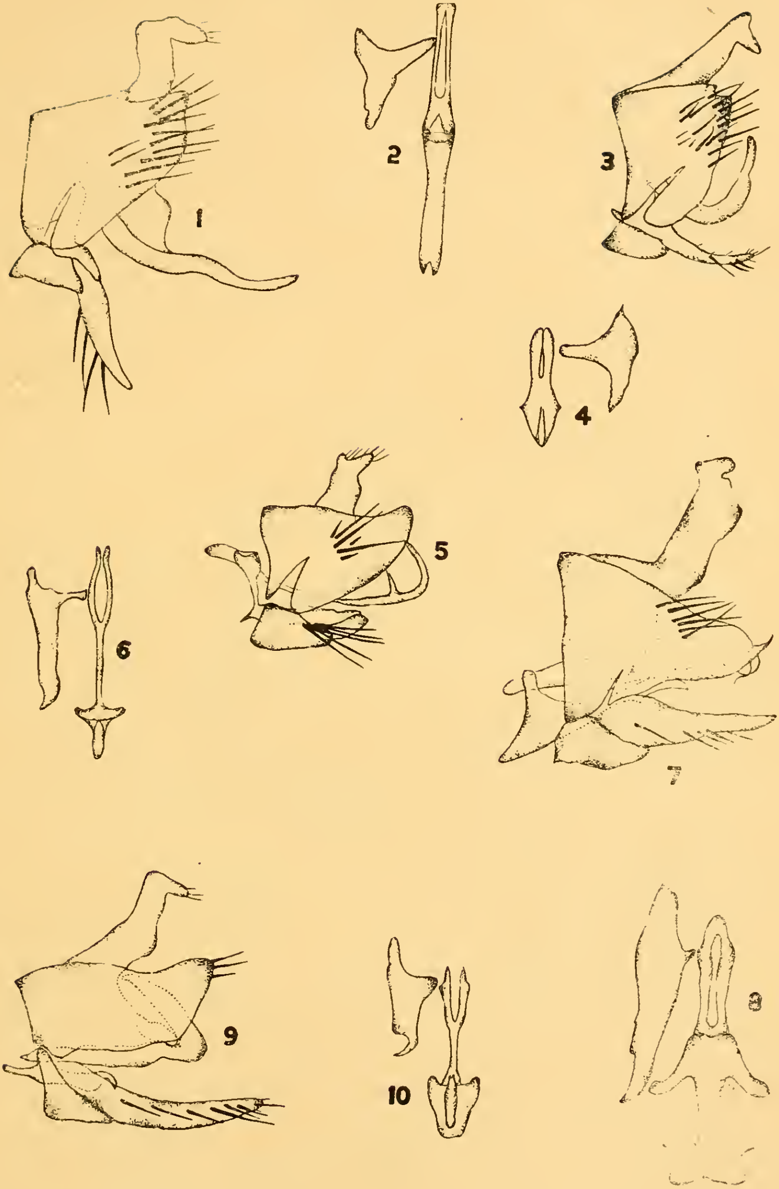
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PLATE XIII.

Euscelis bicolor—

1. Lateral view.
2. Dorsal view of style, connective and œdagus.

Eutettix strobi—

3. Lateral view.
4. Dorsal view of style, connective and œdagus.

Eutettix seminudus—

5. Lateral view.
6. Dorsal view of style, connective and œdagus.

Eutettix cinctus—

7. Lateral view.
8. Dorsal view of style, connective and œdagus.

PLATE XIII.

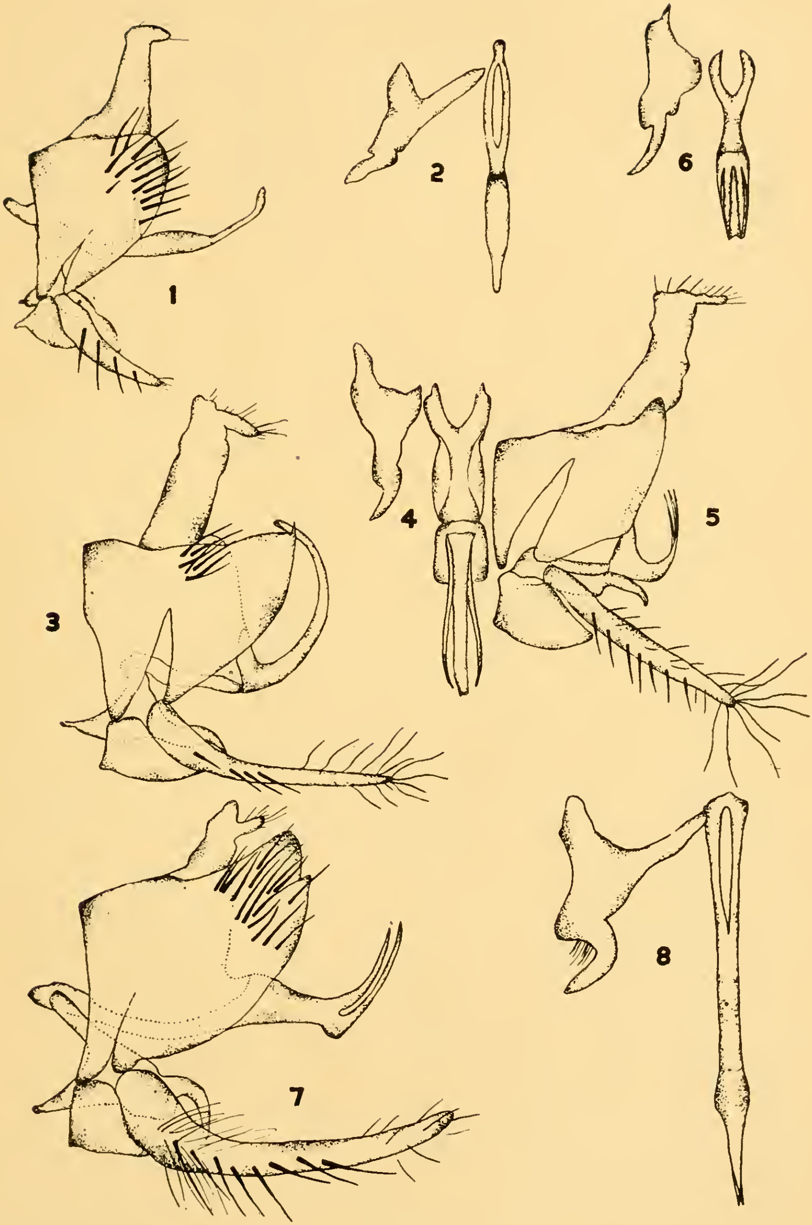


PLATE XIV.

Phlepsius irroratus—

1. Lateral view.
2. Dorsal view of style, connective and œdagus.

Acinopterus acuminatus—

3. Lateral view.
4. Dorsal view of plate, style and connective.

Thamnotettix clitellarius—

5. Lateral view.
6. Dorsal view of style, connective and œdagus.

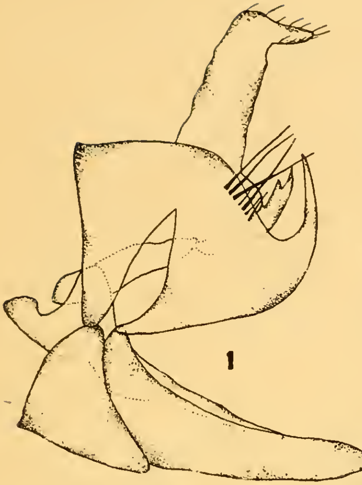
Thamnotettix longulus—

7. Dorsal view of style, connective and œdagus.

Chlorotettix spatulatus—

8. Dorsal view of style, connective and œdagus.

PLATE XIV.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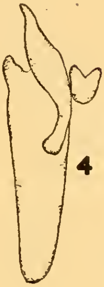
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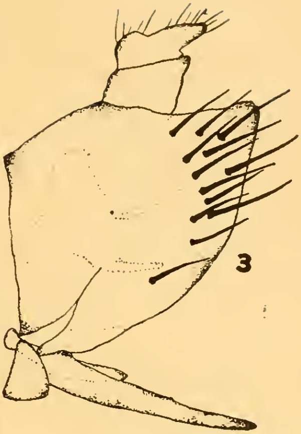
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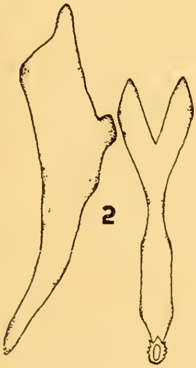
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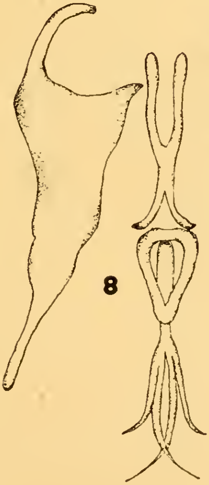
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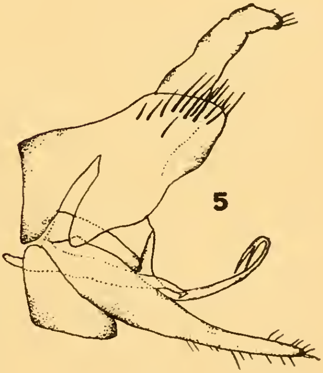
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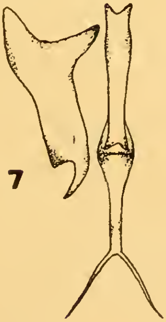
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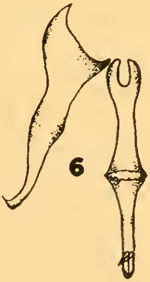
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PLATE XV.

Jassus olitorius—

1. Lateral view.
2. Dorsal view of plates, styles, connective and œdagus.

Cicadula punctifrons var. repleta—

3. Lateral view.
4. Dorsal view of plate, style, connective and œdagus.

Cicadula 6-notata—

5. Lateral view.
6. Dorsal view of style, connective and œdagus.

PLATE XV.

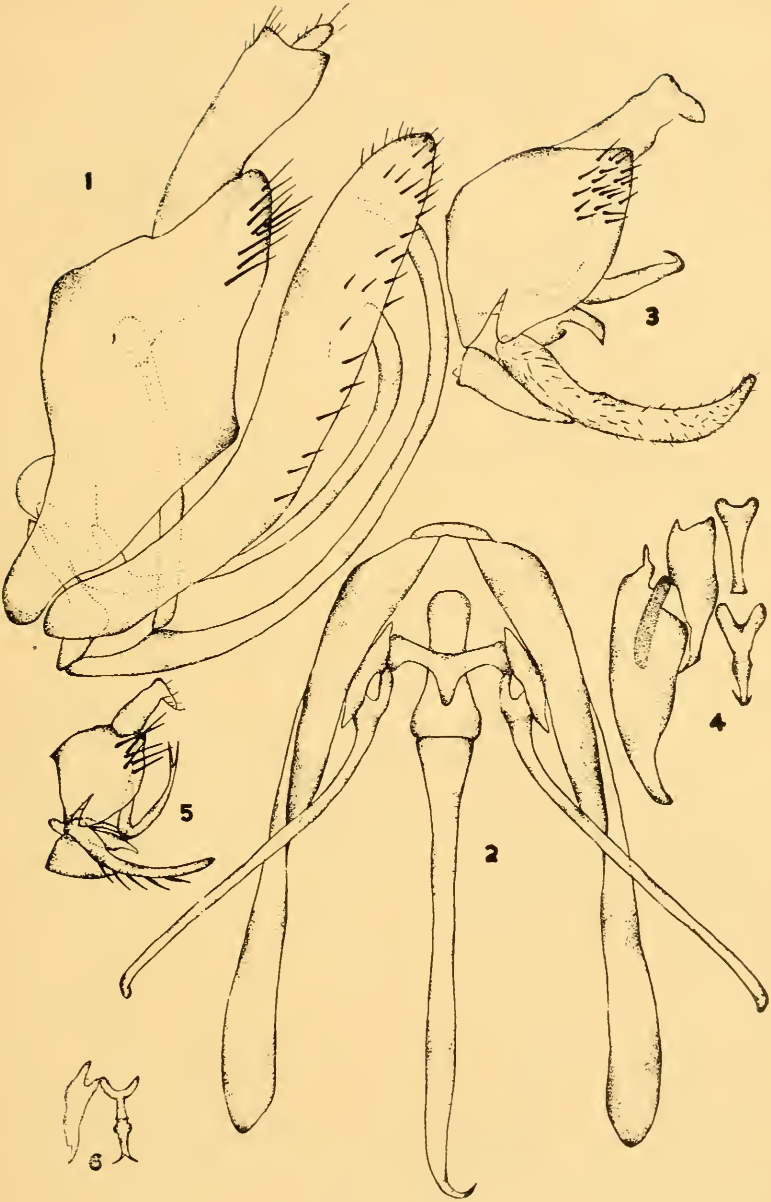

PLATE XVI.

Balclutha punctata—
1. Lateral view.
2. Dorsal view of style, connective and œdagus.

Balclutha impicta—
3. Lateral view.
4. Dorsal view of style, connective and œdagus.

Eugnathodus abdominalis—
5. Lateral view.
6. Dorsal view of style, connective and œdagus.

Empoasca mali—
7. Lateral view.
8. Dorsal view of style, connective and œdagus.

Typhlocyba rosæ—
9. Lateral view.
10. Dorsal view of style, connective and œdagus.

Hymetta trifasciata—
11. Lateral view.
12. Dorsal view of styles, connective and œdagus.

Erythroneura illinoiensis—
13. Lateral view.
14. Dorsal view of style, connective and œdagus.

Erythroneura tricincta—
15. Lateral view.
16. Dorsal view of style, connective and œdagus.

PLATE XVI.

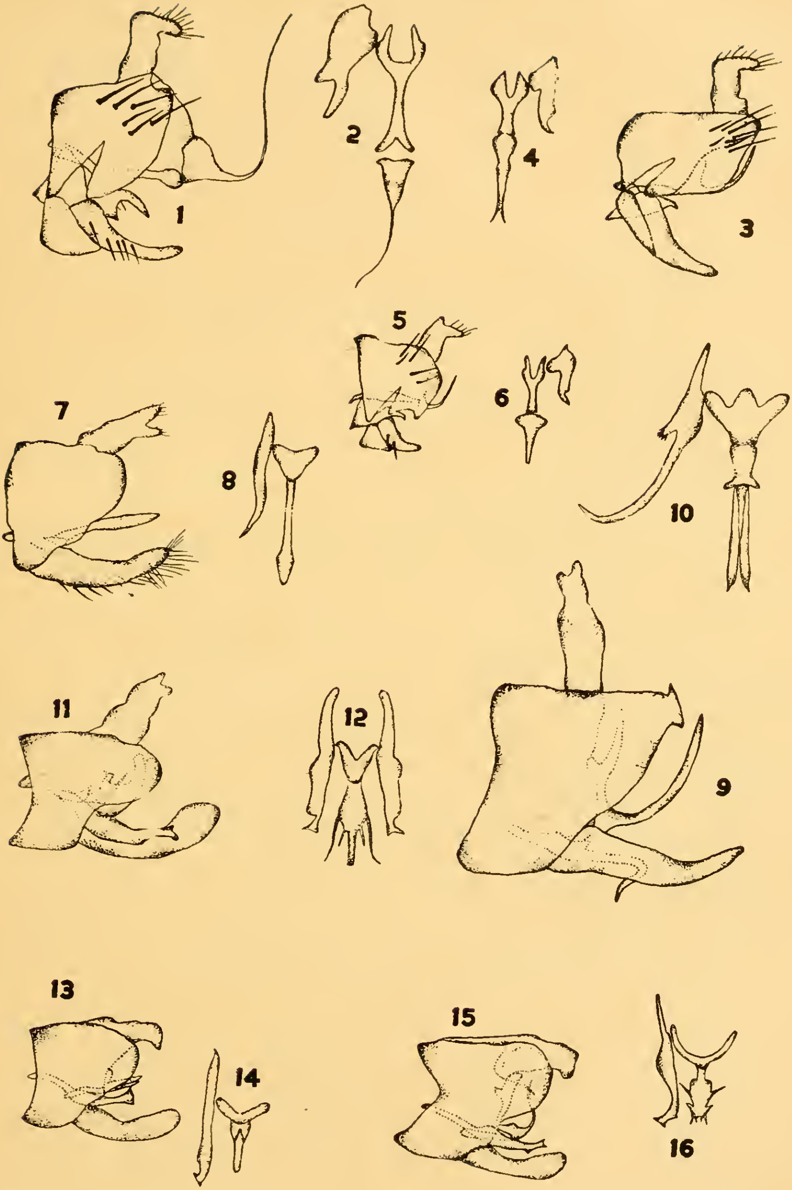
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PLATE XVII.

Erythroneura comes—

1. Lateral view.
2. Dorsal view of style, connective and œdagus.

Erythroneura maculata—

3. Lateral view.
4. Dorsal view of style, connective and œdagus.

Erythroneura basalaris—

5. Lateral view.
6. Dorsal view of style, connective and œdagus.

Erythroneura scutelleris—

7. Dorsal view of style, connective and œdagus and lateral view of process in dorsal margin of pygofer.

Erythroneura fumida—

8. Lateral view.
9. Dorsal view of style, connective and œdagus.

Erythroneura obliqua—

10. Lateral view.
11. Dorsal view of style, connective and œdagus.

Erythroneura vulnerata—

12. Lateral view.
13. Dorsal view of style, connective and œdagus.

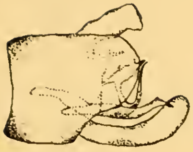
Erythroneura dorsalis—

14. Dorsal view of style, connective and œdagus.

Erythroneura nigra—

15. Dorsal view of style, connective and œdagus.

PLATE XVII.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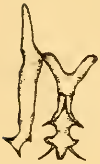
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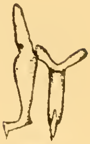
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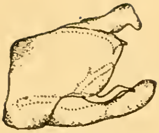
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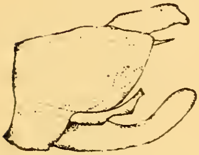
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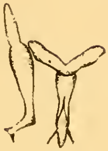
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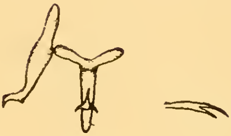
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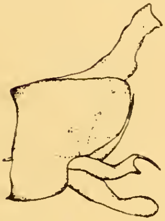
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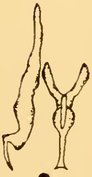
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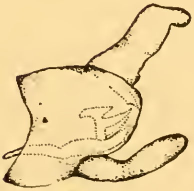
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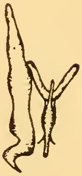
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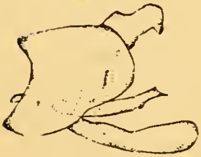

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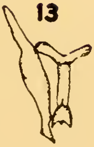

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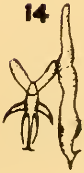

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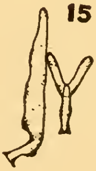

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By P. P. Lawson.

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The Cicadidæ of Kansas.

BY P. B. LAWSON.

For several years the writer has been interested in the Homopterous fauna of Kansas. He has in recent years written systematic papers on the *Coccidæ* and *Cicadellidæ* found in the state, and after working on the latter family, found himself much interested in the *Homoptera-Auchenorhynchi* as a group.

In looking over the material belonging to this group in the Snow collections, he found that a very representative collection of cicadas was on hand and at once became interested in studying them. Most of this material had been gathered and arranged by Mr. R. H. Beamer, formerly assistant curator of the Snow collections. He himself had intended to publish on the group, but just as he was about ready to undertake the work, he gave up active work in entomology, and so his material fell into the writer's hands. The writer wishes therefore to acknowledge his indebtedness to him and also to Mr. Wm. T. Davis, who not only identified all the material sent him by Mr. Beamer and myself, but also sent me for study other specimens necessary for the prosecution of the work.

In the Journal of the New York Entomological Society, Vol. xxvi, Nos. 3 and 4, 1918, Mr. Davis published a paper on the cicadas of Mississippi. In this paper he records eighteen species from that state and remarks on this relatively large number of species within a single state. Records show that twenty-one species have been taken in Kansas, and specimens of these are now in the Snow collection. A pair of *Tibicen resonans* was very kindly given us by Mr. Davis for the collec-

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tion as this species has been taken only a single time in the state.

It is very likely that with more thorough and extensive collecting several more species will be found in Kansas. The writer has been greatly impressed with the number of cicadas that apparently reach one of the limits of their geographical distribution in the state. Thus the Kansas members of the western genus *Okanagana* seem to reach their eastern limit in the state. Similarly the eastern and southern genus *Tibicina* seems to reach its western limit with us. Various members of the genus *Tibicen* also just enter Kansas. Thus we have *T. bifidus* reaching eastward into the western counties. The eastern *T. pruinosa* seems to be very common in eastern Kansas but does not occur in the western part. The eastern and southern *T. lyricen* seems to reach its northwestern limit in the southeastern counties of our state. The southern *T. vitripennis* reaches its northern limit in the southern counties. The relatively eastern *T. marginalis* is found in the eastern two-thirds of the state, while the closely related *T. dealbata* evidently does not go much further east than central Kansas. Again, *T. linnei* seems to reach its western limit with us while *T. superba* and *T. eugraphica* are not found further north. *Proarna venosa* likewise finds its northern boundary in the state, and *Tibicinoides hesperius* is confined to the western counties and likely reaches its eastern limits with us.

This convergence in one state of so many species of varied distribution is undoubtedly due to its central geographical position, to the extremes of its rainfall, and to its varying elevation. Thus the eastern part of the state is distinctly mesophytic, starting with an elevation of 800 feet and with an average rainfall of as high as 45 inches. This condition gradually changes as one goes west over the gradually rising and drier portions of the state, till at its western border the elevation has reached 3,600 feet and the average rainfall has decreased to as low as 16 inches. With this change one finds a corresponding change both in the flora and fauna which is very evident even to the casual observer, at least as far as the flora is concerned. This latter change, combined with those causes which produce it, is undoubtedly responsible for the variety of insect forms and their distribution in the state, for it has repeatedly been found that in many if not all groups of insects, the eastern and western faunas meet somewhere in the central portions of our state. This condition seems to prevail in spite of the fact that most life zone maps show nearly all of the state as belonging to the Upper Austral while just a few southeastern counties come into the northern limits of the Lower Austral.

An attempt has been made in this paper to start on a study of various structural characters to determine their importance as aids in systematic work. Thus a beginning has been made in the study of the ovipositors of the species occurring in the state. Much more work will be necessary before one could be dogmatic about their value, but at present it seems certain that in some cases at least the ovipositors are characteristic of the species. The writer hopes to continue this study with a larger series of each species as well as with more species and give his results in a future paper. Similarly the study of the last ventral segments of both sexes will in some cases reveal good taxonomic characters.

The form of the descriptions here given will also be rather new, but the attempt has been made to bring this form more into harmony with that used to describe the members of the other families of the same group. It is hoped that this might be an aid in the study of these families.

Characteristics of the Cicadidæ.

The *Cicadidæ* are a very interesting family belonging to the *Homoptera-Auchenorhynchi,* this group being distinguished from the *Homoptera-Sternorhynchi* by having the beak arising from the lower part of the head instead of apparently arising from between the prothoracic legs, as in the latter group.

To the *Homoptera-Auchenorhynchi* belong five families, of which the *Cicadidæ* are easily the largest insects. Aside, however, from their relatively larger size, there are very distinct and characteristic structural differences between this family and the others. Thus the members of the *Cercopidæ* and *Cicadellidæ* usually have their fore wings distinctly thicker than the hind wings, whereas in the *Cicadidæ* both pairs of wings are similar in texture. The antennæ of some of the *Fulgoridæ* are very irregular and peculiar in form, while those of the Cicadids are always setiform. Rarely do the members of the other families, the *Aphididæ* excepted, ever have three ocelli, this being a distinct characteristic of the *Cicadidæ.* The front femora also of these insects are quite characteristic, being thickened and toothed beneath. Finally the group is characterized by having males which are musical, so that each species has its peculiar song, a condition unknown in any other *Homoptera.*

Systematic Treatment of the Kansas Species.

Van Duzee in his catalogue has divided the *Cicadidæ* into three subfamilies, each of which is represented by one or more genera in Kansas. The following is his key to these subfamilies:

KEY TO SUBFAMILIES.

Tympanal coverings present in the male, 1.

Tympanal coverings absent in the male. Subfamily 3 *Tibicininæ* (Dist.)

1. Tympanal coverings entirely concealing the orifices. Subfamily 1 *Tibiceninæ* Van D.

Tympanal coverings imperfect, leaving the orifices more or less exposed. Subfamily 2 *Cicadinæ* Van D.

Subfamily TIBICENINÆ Van D.

The members of this subfamily are distinguished from those of the other two subfamilies by having the tympanal coverings entirely concealing the tympanal orifices. Most of our cicadas belong here.

The genus *Tibicen* is the only genus belonging to the *Tibiceninæ* that is represented in our Kansas fauna.

Genus TIBICEN Latr.

This genus contains species that vary much in size, ranging from very large to rather small forms. They all, however, have characteristically broad heads and their opaque abdomens taper regularly behind. The mesonotum completely covers the middle of the metanotum and the tympanal orifices of the male are completely hidden by the tympanal coverings. The opercula are large and usually are close together or overlap medially.

This is by far the largest genus in Kansas, fourteen of the twenty-one species of the state belonging here. These may be separated by the following key:

KEY TO SPECIES.

A. Large, heavy bodied species; uncus simple.
  B. Uncus distinctly longer than broad, not triangular.
    C. Uncus long, slender and curved, bifid apically. *bifida.*

A. Large, heavy bodied species—*concluded.*

- CC. Uncus broader, with broadly rounded apex.
  - D. Species light, not strongly marked with black; apex of wings strongly infuscated. *superba.*
  - DD. Species dark, strongly marked with black; apex of wings slightly infuscated.
    - E. Hind margin of pronotum or collar greenish.
      - F. Larger species, averaging 30 mm. or over in length, and with a distinct longitudinal black band on under side of the abdomen.
        - G. Margin of fore wings not bent; opercula broad, broadly rounded behind; males usually with attenuated pruinose stripe on dorsum of third segment. *pruinosa.*
        - GG. Margin of fore wings suddenly bent near the middle; opercula narrowed apically and more angulate behind. *linnei.*
      - FF. Smaller species, averaging about 25 mm. in length and without a distinct longitudinal black band on the under side of the abdomen. *aurifera*
    - EE. Hind margin of pronotum or collar blackish. *lyricen.*

BB. Uncus usually about as wide as long, usually triangular, but with the apex often truncate.

- C. Wings long and slender; a large ferrugineous and black species. *resonans.*
- CC. Wings broader; species greenish and black.
  - D. Very large species, expanding over 110 mm. Flaps of wings gray. *auletes*
  - DD. Smaller species, seldom expanding 110 mm. Flaps of wings usually with yellowish or orange tinge.
    - E. Fore wings with cross veins between R_3 and R_{4+5} and between the latter and M_1 distinctly darkened. Posterior margins of abdominal terga not lighter.
      - F. Abdominal terga with a dorsal row of pruinose spots; uncus somewhat triangular, apex obtuse. *dorsata.*
      - FF. Abdominal terga without dorsal pruinose spots; uncus broadly truncate apically. *resh.*
    - EE. Fore wings with cross veins between R_3 and R_{4+5} and between the latter and M_1 not at all or slightly darkened. Posterior margin of abdominal terga lighter.
      - F. Head broad, wings rather narrow; abdominal terga without dorsal pruinose spots and not strongly pruinose laterally. *marginalis*
      - FF. Head narrower, wings broader; abdominal terga with dorsal row of pruinose spots and strongly pruinose laterally. *dealbata.*

AA. Small species; uncus wishbone shaped.
  B. Orange and black species; arms of uncus strongly curved and widely separated apically, arms of ventral piece stout when viewed caudally. *eugraphica.*
  BB. Green and black species; arms of uncus straighter and not as widely separated apically, arms of ventral piece slender when viewed caudally. *vitripennis.*

Tibicen bifidus (Davis).

(Pl. xxi, figs. 1-2; pl. xxv, fig. 4; pl. xxvi, fig. 9; pl. xxvii, fig. 13.)
Cicada bifida Davis, Jl. N. Y. Ent. Soc., xxiv, p. 47, 1916.
Tibicen bifidus Van D., Cat. Hemip. N. A., p. 489, 1917.

A black and yellowish-brown species of medium size. Specimens at hand measure from 25 to 29 mm.

Color: Head black, with the following marked with yellowish-brown, sometimes tinged with green: The antennal ledges, a triangular spot in front of ocelli, a spot of varying size just in front of this, and irregular spots along the caudal margin laterad of the ocelli. Pronotum yellowish- to brownish-green, pruinose in spots, with a large black median T-shaped or triangular spot extending from the collar to the head, which often contains a yellowish-green spot. The grooves are blackened in varying degree and often have black spots between them. Collar with black spots in the humeral angles and often some between these and the median spot. Mesonotum black, often pruinose in spots, with the W-shaped mark and the sides yellowish-green, as is also the cruciform elevation, the anterior arms of the latter almost touching the W. Abdominal terga black with the sides brownish-yellow, the last tergum being almost wholly light, with a faint dorsal row of pruinose spots and often with pruinose markings laterally. Wings with the branches of the veins nearly all black, the costal margin and the bases of the veins, radius and extreme base of media excepted, yellowish-brown; cross veins between R_3 and R_{4+5} and between latter vein and M_1 distinctly darkened. Basal areoles of fore wings with dark dash; flaps of both wings whitish, those of fore wings often with an orange tinge. Beneath nearly unicolorously yellowish-brown except for darker head. Legs, especially prothoracic pair, streaked with dark.

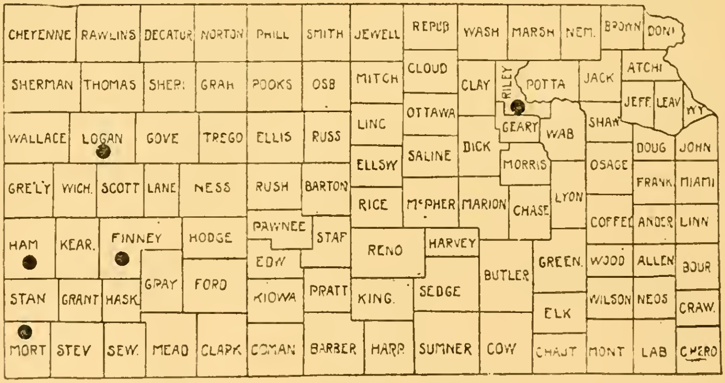
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	25	to 29
Width of head	9	to 9.5
Expanse of fore wings	71	to 74
Greatest width of fore wing	11.5	to 12.5
Greatest width of operculum	6	
Greatest length of operculum	9	

The opercula are fully half as long as the abdomen, overlapping nearly two-thirds their length, then evenly narrowing on both margins to the subacute apices.

Genitalia: Supra-anal plate of male with small, stout, median process and with the lateral angles rounded. The uncus, when viewed laterally, is long and slender and strongly curved and when viewed caudally is widest at the base, then narrowed till near the broadened and distinctly bifid apex. The ventral piece is strongly U-shaped, the arms stout, slightly notched apically, and connected with membranous tissue till near their apices. The last ventral segment of the male is over one-half longer than wide, lateral margins nearly straight, the posterior margin distinctly but not deeply emarginate. The pygofers of the female have a strong median process. The last ventral segment is broadly notched posteriorly nearly one-third the distance to the base. Each of the lateral pieces of the ovipositor bears about fourteen teeth or ridges, at least in the specimen examined, of which the basal ones are small and far apart, the median four or five being quite large, and the terminal four small and crowded.

Distribution: The specimens at hand were taken in the western part of the state in Morton, Hamilton, Logan and Finney counties. In the collection of the Kansas State Agricultural College are specimens from Logan and Riley counties. Outside of Kansas this species is reported to occur in Colorado, Utah and Arizona. The following map shows its distribution in Kansas as far as is now known:


CHEYENNE
RAWLINS
DECATUR
NORTON
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SMITH
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REPUB
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THOMAS
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RILEY
POTTA
JACK
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB
SHAW
SALINE
DICK
DOUG
JOHN
ELLSW
MORRIS
OSAGE
GREELY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK.
MIAMI
PAWNEE
COFFEE
ANDER
LINN
HAM
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FINNEY
HODGE
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RENO
HARVEY
EDW
BUTLER
GREEN.
WOOD
ALLEN
BOUR
STAN
GRANT
HASK.
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS
CRAW.
ELK
MORT
STEV
SEW.
MEAD
CLARK
COMAN
BARBER
HARP.
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Remarks: Of the large number of specimens at hand four are paratypes.

Tibicen superba (Fh.).

(Pl. xxi, figs. 3-4; pl. xxiv, fig. 4; pl. xxvi, fig. 12; pl. xxvii, fig. 18.)
Cicada superba Fh., Trans. N. Y. St. Agr. Soc., xiv, (1854), p. 745, 1855.
Cicada superba Uhl., Trans. Md. Acad. Sci., i, p. 152, 1892.
Tibicen superba Van D., Cat. Hemip. N. A., p. 494, 1917.

A fairly large insect of a beautiful greenish-buff color, sparingly marked with black. Specimens at hand measure from 30 to 33 mm.

Color: Head greenish-buff with a broad transverse black band between the eyes and two small black spots at the base of the front. Pronotum in our specimens is entirely greenish-buff. Mesonotum of the same color with black spots as follows: A pair between the arms of the W, a small triangular pair laterad of these, a still smaller pair just above base of fore wings, and a small spot mesad of the tips of the anterior arms of the cruciform elevation. Abdominal terga not as green as the rest of the body, with small pruinose spots laterally at the base of the first segment and with the base of the second segment sometimes narrowly black. The wings are distinctly smoky apically, the veins being olive-green basally, becoming brown apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are strongly and widely infuscate. The basal areoles of the fore wings are greenish anteriorly. The flaps of both wings are dark gray. Beneath the insect is brownish or buff and entirely pruinose. The legs are of the same color as the underside, distinctly striped and slightly darkening apically.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	30	to	33
Width of head	13.5	to	13.75
Expanse of fore wings	86	to	90
Greatest width of fore wing..........	12	to	12.5
Greatest width of operculum	6.5	to	7
Greatest length of operculum........	9.5	to	10

The opercula are distinctly longer than wide, the lateral margins are slightly sinuate, the mesal margins slightly overlap, and the posterior margins are rounded but with the mesal portion distinctly longer and straighter than the outer part.

Genitalia: Supra-anal plate of male with a stout median tooth which exceeds the rounded lateral angles. The uncus, viewed laterally, is distinctly curved and widens distally to the obtuse apex. Viewed caudally it is a large sclerite nearly twice as long as wide, scarcely narrowing to the broadly rounded apex, and with the usual depression on the dorsal part of its caudal aspect. The ventral piece has its arms widely but not deeply separated. The last ventral segment of the male is distinctly less than twice as wide as long and is strongly rounded posteriorly. The pygofers of the female have a stout and rather short median spine which exceeds the obtusely angulate lateral angles. The last ventral segment of the female has the lateral margins distinctly sinuate, the posterior margin with a broad angular emargination which reaches half way to the base. The lateral pieces of the ovipositor each bear at first five low ridges followed by two prominent teeth and then about six small and indistinct teeth.

Distribution: The only record we have of the occurrence of this species in the state is from Barber county. It seems to be a distinctively southern species as shown by its distribution as given by Van Duzee, who records it from Arkansas, Oklahoma, New Mexico and Texas.

Tibicen pruinosa (Say).

(Pl. xviii, figs. 3-4; pl. xxiv, fig. 3; pl. xxvi, fig. 10; pl. xxvii, fig. 10.)

Cicada pruinosa Say, Jl. Acad. Nat. Sci. Phila., iv, p. 330, 1825; Compl. Writ., ii, p. 251.
Cicada pruinosa Harris, Rept. Ins. Mass., p. 176, 1841.
Cicada bruneosa Wild, Ann. Soc. Ent. Fr., ser. 2, x, Bul., p. xviii, 1852.
Cicada pruinosa Harris, Treat. Ins. Inj. Veg., edn. 3, p. 218, 1862.
Cicada canicularis Prov., Pet. Faune Ent. Can., iii, p. 211, 1889.
Cicada pruinosa Davis & Jout., Ent. News, xvii, p. 237, 1906.
Cicada pruinosa Sm. & Grsb., Ent. News, xviii, p. 123, 1907.
Tibicen pruinosa Van D., Cat. Hemip. N. A., p. 490, 1917.
Tibicen pruinosa Davis, Jl. N. Y. Ent. Soc., xxvi, p. 145, 1918.

A green and black species of fairly large size. Specimens at hand measure from 29 to 33 mm.

Color: Head black, with the following marked with green or brownish-green: The antennal ledges and the space between them and the eyes, a median elliptical spot on upper portion of front, sometimes three spots at base of the front, and the posterior margin between the ocelli and the compound eyes. Pronotum green or brownish-green except for two large black median spots which taper caudad, uniting just before the collar, and enclosing an elongate greenish spot. Frequently some of the grooves, parts of the lateral margins, and the portions just behind the eyes, are tinged with black. Mesonotum green, marked with black as follows: The spaces between the arms of the W, a spot on each side laterad of the arms which are joined sometimes by a slender line with a spot on the posterior margin, laterad of these a third pair of spots which may join the second pair posteriorly, and with a large spot between the W and the light cruciform elevation, its apex reaching up between the inner arms of the former. Abdominal terga entirely black, first segment with large lateral pruinose spots which sometimes reach over to the second segment, the third segment sometimes with attenuated lateral stripes, the eighth segment and the seventh of the female also pruinose laterally. Wings with veins greenish basally, except the base of media, becoming brown on apical half, and with the cross veins between R_3 and R_{4+5} and between the latter vein and M_1 distinctly darkened. Basal areoles of the fore wings greenish but without distinct dash; flaps of fore wings grayish, those of hind wings gray, becoming white posteriorly. Beneath more or less strongly pruinose except for shining black median portion of the abdomen. Legs light, darkening towards the tips of the tibiæ.

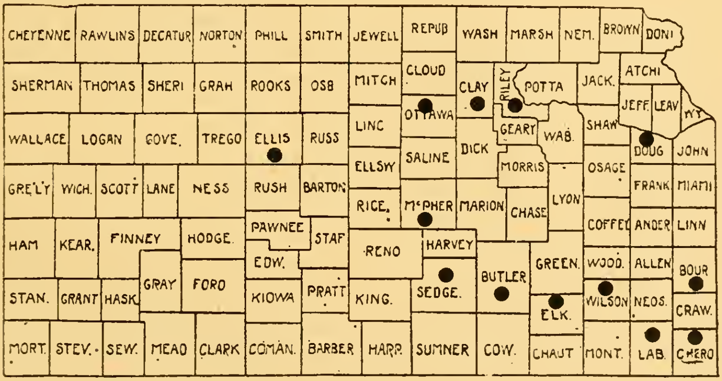
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	25	to	29
Width of head	12	to	13.5
Expanse of fore wings	96	to	100
Greatest width of fore wing	13.5	to	15
Greatest width of operculum	7	to	7.5
Greatest length of operculum	9.25	to	9.75

Opercula, excluding the extension beyond the coxal cavity, about as long as broad, overlapping medially, and rounded apically but with inner apical margin straighter and longer than the outer.

Genitalia: Supra-anal plate of male with a strong median process which exceeds the rounded lateral angles. Uncus, when viewed laterally, is stout, straight, and parallel-margined till near the apex, when the caudal margin suddenly tapers to the acute apex. Viewed caudally it is a large sclerite, over one-half longer than wide, with a broadly rounding, nearly truncate, subapically depressed apex, and with a large triangular depression on the dorsal part of its caudal aspect. The ventral piece is strongly V-shaped, with the arms rather slender when viewed caudally but appearing stout from a lateral view. The last ventral segment of the male is twice as wide as long, the lateral margins very slightly sinuate, the apex broadly rounded. The pygofers of the female have a slender and acute median process which greatly exceeds the lateral angles. Last ventral segment of the female with a broad, distinctly angulate notch reaching nearly half way to the base. In the specimen examined the lateral pieces of the ovipositor each bore about a dozen ridges or teeth, of which the first four were ridge-like and the rest more tooth-like.

Distribution: This is one of our commonest species. In and around Lawrence it is by far the commonest form. As shown by the following map it is decidedly eastern in its distribution in the state. The record from Riley county is that of the Kansas State Agricultural College. Van Duzee records it from the following other states: Pennsylvania, Indiana, Missouri, Nebraska and Texas. Davis says its distribution is that of the general region of the valley of the Mississippi.


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
OTTAWA
WALLACE
LOGAN
GOVE.
TREGO
ELLIS
RUSS
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GEARY
WAB.
SHAW
DOUG
JOHN
SALINE
DICK
ELLSW
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
FRANK
MIAMI
RICE.
McPHER
MARION
CHASE
LYON
HAM
KEAR.
FINNEY
HODGE.
PAWNEE
STAF
RENO
HARVEY
COFFEE
ANDER
LINN
EDW.
GREEN.
WOOD.
ALLEN
BOUR
GRAY
FORD
BUTLER
STAN.
GRANT
HASK
KIOWA
PRATT
KING.
SEDGE.
WILSON
NEOS.
CRAW.
ELK.
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB.
CHERO

Remarks: Davis speaks of the song of this species as follows: "The song of *pruinosa* is quite unlike that of any of the other large native cicadas, and may be rendered as *z-zape, z-zape, z-zape.* The insect often remains quiet all day, singing from about 3 or 4 p. m. until dark."

Tibicen linnei (Sm. & Grsb.).

(Pl. xviii, figs. 1-1; pl. xxiv, fig. 2; pl. xxvi, fig. 11; pl. xxvii, fig. 16.)

Cicada linnei Sm. & Grsb., Ent. News, xviii, p. 127, 1907.
Cicada tibicen Germ., Mag. d. Ent., iv, p. 95, 1821.
Fidicina tibicen Walk., List Homop., i, p. 94, 1850.
Thopha chloromera Walk., List Homop., i, p. 43, 1850.
Cicada tibicen Fh., Trans. N. Y. St. Agr. Soc., xv, p. 367, No. 73, 1856.
Cicada tibicen Harris, Treat. Ins. Inj. Veg., edn. 3, p. 219, 1862.
Cicada tibicen Uhl., Stand. Nat. Hist., ii, p. 227, 1884.
Cicada tibicen Woodw., Psyche, v, p. 68, 1888.
Cicada tibicen Uhl., Trans. Md. Acad. Sci., i, p. 149, 1892.
Cicada tibicen Macg., Can. Ent., xxxiii, p. 82, 1901.
Cicada tibicen Felt, N. Y. St. Mus. Memoir, 8, i, p. 237, pl. 46, fig. 1, 1905.
Rihana tibicen Dist., Cat. Homop., Cicadidæ, p. 36, 1906.
Cicada tibicen Davis & Jout., Ent. News, xvii, p. 238, 1906.
Cicada tibicen Tuck., Kans. Univ. Sci. Bul., iv, p. 64, 1907.
Cicada linnei Davis, Jl. N. Y. Ent. Soc., xxiii, p. 10, 1915.
Tibicen linnei Van D., Cat. Hemip. N. A., p. 490, 1917.
Tibicen linnei Davis, Jl. N. Y. Ent Soc., xxvi, p. 146, pl. 7, fig. 1, 1918.

A green and black species looking like *T. pruinosa* in form and color. Specimens at hand measure from 30.5 to 33 mm.

Color: Head mostly black, with the following marked with green: A broad stripe on each side along antennal ledge from front to eyes, these stripes each with a small black spot near the front, an elliptical spot on upper portion of front connected with a median triangular spot at base of front, and with irregular marks along posterior margin laterad of each lateral ocellus. Pronotum green, with two large black posteriorly tapering median spots which enclose a wedge-shaped green mark, and with the grooves and back of the eyes frequently black, there sometimes being a black spot also on the lateral margins. Mesonotum green, marked with black as follows: Between the arms of the W, a large spot on each side laterad of this which extends taperingly to posterior margin, a smaller spot on each side laterad of these, and a large spot cephalad of the light cruciform elevation, this spot having a narrow anterior process which reaches between the median arms of the W. Abdominal terga black, the posterior margins sometimes being testaceous. First segment in males with a pair of small but distinct pruinose spots. The wings have the veins, with the exception of media, greenish basally and becoming brownish apically. The cross veins between R_3 and R_{4+5} and between the latter vein and M_1, are strongly and broadly infuscated. The basal areoles of the fore wings are green. The flaps of both wings are grayish or brownish. Beneath the insect varies from greenish to testaceous, the opercula being lighter than the rest of the under side and fresh specimens are entirely pruinose with the exception of the black median portion of the abdomen. The legs are light brown or greenish with a tendency to darken apically.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	30.5	to	33
Width of head	14.25	to	15
Expanse of fore wings..............	94	to	100
Greatest width of fore wings.......	14	to	14.5
Greatest width of operculum.........	6.5		
Greatest length of operculum........	8	to	8.5

The costal margin of the fore wings is slightly but distinctly bent near the middle. The opercula are longer than broad. They slightly overlap along their mesal margins, the lateral margins are sinuately narrowed posteriorly and the posterior margin runs cephalo-mesad in a straight line from the rounded lateral angles.

Genitalia: Supra-anal plate of male with a very broad but short median spine which scarcely exceeds the rounded lateral angles. Uncus, when viewed laterally, is curved on its posterior margin to the semi-obtuse apex. When viewed caudally it is a large sclerite less than twice as long as wide and gradually tapering from the base to the broadly rounded apex. The upper portion of the caudal aspect shows a large triangular depression. The ventral piece is U-shaped with the arms fairly deeply divided. The last ventral segment of the male is over twice as wide as long, and slightly emarginate apically. The pygofers of the female have a prominent and acute median spine which strongly exceeds the strongly-angled lateral angles. The last ventral segment of the female has the lateral margins sinuate and the posterior margin broadly and angularly emarginate nearly one-half the distance to the base. The lateral pieces of the ovipositor each bear about twelve teeth or ridges, of which the median four alone are distinct.

Distribution: The only Kansas records for this species are from Sedgwick, Douglas and Clay counties, the former two by E. S. Tucker and the last by Wm. T. Davis. Outside of Kansas it is found in Massachusetts, New York, Michigan, Tennessee, North Carolina, Illinois, and Mississippi, so that Kansas would seem to be its western limit.

Remarks: Davis says that the song of this species is a continuous *z-ing,* generally of a short duration. All the specimens examined by the writer were from North Carolina.

Tibicen aurifera (Say).

(Pl. xxii, fig. 1-2; pl. xxiv, fig. 5; pl. xxvi, fig. 15; pl. xxvii, fig. 12.)

Cicada aurifera Say, Jl. Acad. Nat. Sci. Phila., iv, p. 332, 1825; Compl. Writ., ii, p. 252.
Cicada aurifera Woodw., Psyche, v, p. 68, 1888.
Cicada aurifera Uhl., Trans. Md. Acad. Sci., i, p. 153, 1892.
Cicada aurifera Kirk., Ent., xxxiii, p. 242, 1900.
Cicada aurifera Macg., Can. Ent., xxxiii, p. 80, 1901.
Cicada aurifera Davis, Jl. N. Y. Ent Soc., xxiv, p. 44, 1916.
Tibicen aurifera Van D., Cat. Hemip. N. A., p. 492, 1917.

A rather small species usually green and black but sometimes varying to reddish-brown and black, having the body covered with a golden pubescence. Specimens at hand vary from 23 to 26 mm. in length.

Color: Head black, with the following marked with greenish to brownish: The antennal ledges and a broad spot between them and the eyes, a median elliptical spot on upper portion of the front with sometimes a spot caudad of this, spots at basal angles of the front, a spot laterad of each lateral ocellus, and irregular spots between these and the eyes along the posterior margin. Pronotum largely greenish, sometimes varying to reddish-brown, with two irregular black spots enclosing a median wedge-shaped green spot. Mesonotum green to reddish-brown, marked with black as follows: Between the arms of the W, a large spot tapering to posterior margin on each side laterad of the W, and a smaller spot on each side laterad of this, the latter two spots on each side often fusing, and a large black spot in front of the cruciform elevation with a long slender point reaching between the two middle arms of the W. Abdominal terga usually black, though sometimes the posterior margins are testaceous. Wings with veins all greenish to reddish-brown basally, becoming darker apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are distinctly darkened and practically spot-like. The basal areoles of the fore wings are greenish anteriorly; the flaps of both wings are grayish. Beneath brownish, entirely pruinose when fresh, rubbed specimens showing oblong black spot at base of each abdominal sternite. Opercula usually lighter than rest of under side. Legs light, excepting front legs, becoming darker apically.

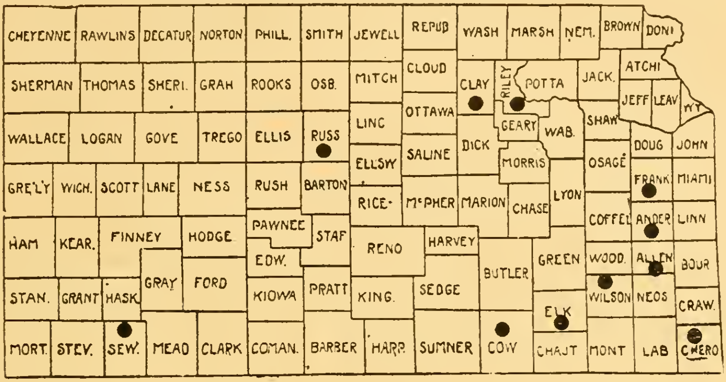
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	23 to 26
Width of head	10 to 12
Expanse of fore wings	66 to 76
Greatest width of fore wing	10 to 11
Greatest width of operculum	5 to 5.5
Greatest length of operculum	7.5 to 8

The opercula are slightly overlapping medially, the apices are very broadly rounded, the inner margin being slightly longer than the outer.

Genitalia: The supra-anal plate of the male has a stout but acute median spine, which clearly exceeds the rounded lateral angles. The uncus when viewed laterally is curved and widens till near the apex, when the inner margin suddenly tapers and forms an angle with the outer margin. Viewed caudally it is a large sclerite, about twice as long as wide, scarcely tapering to the broadly rounded apex, and broadly and rather deeply emarginate dorsally. The ventral piece is deeply U-shaped. The last ventral segment of the male is fully twice as wide as long and hemispherical in outline. The pyfogers of the female have a stout but very acute median spine which strongly exceeds the lateral angles. The last ventral segment of the female is distinctly sinuate laterally and the posterior margin is broadly but angularly emarginate fully one-half of the distance to the base. The ovipositor has lateral pieces, each bearing about fourteen teeth or ridges, which are for the most part separated by deeper incisions than in the other species examined. The ovipositor in this case seems to be specifically distinct.

Distribution: This species has so far been reported from Kansas only. It is apparently most abundant in the eastern part of the state, as shown by the county records on the following map. The records from Riley, Cowley and Russell counties are those of the Kansas State Agricultural College. Further collecting will doubtless reveal this species from the neighboring states.


CHEYENNE
RAWLINS
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HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS
CRAW.
ELK
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW
CHAUT
MONT
LAB
CHERO

Tibicen lyricen (De G.).

(Pl. xviii, figs. 5-6; pl. xxiv, fig. 1; pl. xxvi, fig. 8; pl. xxvii, fig. 11.)

Cicada lyricen DeG., Memoires, iii, p. 212, pl. 32, fig. 23, 1773.
Cicada fulvula Osb., Ent. News, xviii, p. 322, 1906.
Cicada lyricen Sm. & Grsb., Ent. News, xviii, p. 125, 1907.
Cicada lyricen Barb., Proc. Ent. Soc. Wash., xiv, p. 210, 1912.
Tibicen lyricen Van D., Cat. Hemip. N. A., p. 491, 1917.
Tibicen lyricen Davis, Jl. N. Y. Ent. Soc., xxvi, p. 147. pl. 8, fig. 1, 1918.

A black and fulvous species of about the same size or slightly larger than *T. pruinosa.* Specimens at hand measure from 31 to 34 mm.

Color: Head black, with the following marked with fulvous: The antennal ledges and a spot from them to the eyes, a median elliptical spot on the upper portion of the front, caudad of this a triangular median spot, a spot laterad of this at each corner of the front, a spot laterad of each lateral ocellus, and irregular spots on posterior margin of head laterad of the latter. The eyes are dark fulvous. Pronotum mostly fulvous in our specimens but with collar and lateral margins always black, and with two large black median lines which, narrowing posteriorly, meet at the collar, thus enclosing an elongate, median, fulvous spot. Mesonotum fulvous, with space between outer arms of W entirely black, a black spot on each side laterad of this, a black line on each side near the margin, and a large black spot between the W and the usually fulvous cruciform elevation. Abdominal terga black, the posterior margin of the first segment sometimes fulvous. Pruinose markings on first segment either absent, reduced to lateral spots, or forming a narrow line. In some specimens lateral pruinose spots on the seventh tergite are visible from above. Wings, with the exception of the black basal portion of media, have the veins greenish on basal half and dark fulvous apically. Sometimes the green is largely replaced by the fulvous. The cross veins between R_3 and R_{4+5} and between the latter vein and M_1 are distinctly darkened. The basal areoles of the fore wings for the most part are greenish; flaps of fore wings dark gray, those of hind wings lighter. Beneath the body is entirely pruinose with the exception of the black median portion of the abdomen. The opercula are paler than the rest of the body. The legs are fulvous, becoming paler apically.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	31	to	34
Width of head	14	to	15
Expanse of fore wings	100	to	102
Greatest width of fore wing	14	to	15
Greatest width of operculum	6.5	to	7
Greatest length of operculum	9	to	10

The opercula are about as broad as long, excluding the extension beyond the coxal cavity. They overlap medially and the posterior margins are broadly rounded, the inner margin of the apex being longer and straighter than the outer margin.

Genitalia: The supra-anal plate of the male has a stout median spine which scarcely exceeds the rounded lateral angles. The uncus, when viewed laterally, is stout and curved, the inner margin tapering rather suddenly apically to the obtuse apex. Viewed caudally it is a large sclerite, distinctly narrowed toward the obtusely rounded apex, and with a large triangular depression on the dorsal portion of its caudal aspect. The ventral piece is strongly U-shaped. The last ventral segment of the male is fully twice as broad as long and slightly but distinctly emarginate apically. The pygofers of the female have a slender and acute median process which greatly exceeds the lateral angles. The last ventral segment of the female is very broad and narrow, the lateral margins distinctly sinuate, and the posterior margin with a large and broadly rounded emargination which reaches about one-third of the distance to the base. The ovipositor is rather sparsely toothed, each lateral piece bearing about ten rather blunt teeth or ridges.

Distribution: Specimens of this species have been taken in Cherokee, Wilson, Elk, and Riley counties. It may be that this state is its northwestern limit for Van Duzee records it as an eastern and southern form found in Ontario, Rhode Island, New York, New Jersey, North Carolina, Florida, Alabama, Ohio, and Indiana. Smith and Grossbeck record it from New Brunswick also.

Remarks: Davis states that the song of this species is a monotonous *zing*.

Tibicen resonans (Walk.).

(Pl xix, figs. 3-4; pl. xxiv, fig. 6; pl. xxvi, fig. 13; pl. xxvii, fig. 9.)

Cicada resonans Walk., List Homop., i, p. 106, 1850.
Cicada resonans Davis, Jl. N. Y. Ent. Soc., xxiii, p. 6, pl. 1, fig. 2, 1915.
Tibicen resonans Van D., Cat. Hemip. N. A., p. 493, 1917.
Tibicen resonans Davis, Jl. N. Y. Ent. Soc., xxvi, p. 148, 1918.

A ferrugineous and black species of large size. Specimens at hand measure from 38 to 40 mm.

Color: Head black, with ferrugineous spots as follows: Along the antennal ledges and on to the eyes, a median and two lateral spots at the base of the front, and irregular marks along the posterior margin laterad of the lateral ocelli to the eyes. Pronotum mostly ferrugineous with the grooves, an almost continuous line along the anterior margin, parts of the lateral margins and other variable spots, black. Mesonotum ferruginеous with black spots as follows: Between the arms of the W, a usually smaller spot on each side laterad of this, a spot along each lateral margin, and a large transverse spot cephalad of the ferrugineous cruciform elevation which has a slender anterior process reaching between the median arms of the W. The wings have the veins entirely ferrugineous as are the basal areoles of the fore wings. The cross veins between R_3 and between R_{4+5} and between the latter vein and M_1 are clearly but not strongly darkened. The flaps of both wings are grayish or buff. The abdominal terga are black. Beneath the insect is dark brown or ferrugineous with the opercula lighter. The specimens at hand are partly pruinose. The legs are ferrugineous.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	38 to 40
Width of head	17 to 17.5
Expanse of fore wings..................	115
Greatest width of fore wing.............	15
Greatest width of operculum.............	8
Greatest length of operculum............	8

Opercula, excluding extension beyond the coxal cavity, broader than long, overlapping for a short distance medially, the posterior margins forming a broad and nearly regular curve.

Genitalia: Supra-anal plate of male with a broad but shallow median emargination which bears a broad and short but distinct median tooth which is shorter than the lateral angles. The uncus, when viewed laterally, is broad basally, narrowed medially, and then expanding apically much like a horse's foot. Viewed caudally it is broader than long, slightly narrowing to the broad, truncate apex. The ventral piece is strongly U-shaped, its arms turning strongly laterad apically. The last ventral segment of the male is distinctly less than twice as broad as long, the lateral margins regularly narrowing to the broad truncate apex. The pygofers of the female have an acute median tooth which distinctly exceeds the lateral angles. Last ventral segment of the female with sinuate lateral margins, the posterior margin broadly and angularly emarginate half way to the base. The ovipositor is characterized by the regularity of the teeth of the lateral pieces each of which bears about ten teeth or ridges.

Distribution: The only record of this species for the state is that given by Mr. Wm. T. Davis who reports a single specimen from Kansas in the Museum of Comparative Zoölogy. Van Duzee gives North Carolina, Georgia, Florida, and Alabama as the other states in which it occurs. Davis reports specimens from Mississippi and Louisiana in addition. Thus it is seen to be a distinctively southern species.

Remarks: Davis reports this species as being found in the sand ridges in North Carolina. The specimens examined were kindly sent me by him from this state.

Tibicen auletes (Germ.).

(Pl. xix, figs. 5-6; pl. xxv, fig. 1; pl. xxvi, fig. 1; pl. xxvii, fig. 1.)

Cicada auletes Germ., Silb. Rev. Ent., ii, p. 65, 1834.
Tettigonia grossa? Fabr., Syst. Ent., p. 678, 1775.
Cicada grossa Oliv., Encyc. Meth., v, p. 747, 1790.
Cicada auletes Harris, Rept. Ins. Mass., p. 176, 1841.
Cicada sonora? Walk., List Homop., i, p. 105, 1850.
Cicada literata Walk., List Homop., i, p. 91, 1850.
Cicada auletes Harris, Treat. Ins. Inj. Veg., edn. 3, p. 218, 1862.
Cicada marginata How., Insect Book, p. 232 (*emarginata*), pl. 28, fig. 19, 1905.
Cicada marginata Sm. & Grsb., Ent. News, xviii, pl. 3, fig. 1, 1907.
Rihana grossa Dist., Genera Ins., fasc. 142, p. 29, 1912.
Cicada auletes Davis, Jl. N. Y. Ent. Soc., xxiii, p. 2, pl. 1, fig. 1, 1915.
Cicada auletes Weiss, Ent. News, xxvii, p. 162, 1916.
Tibicen auletes Van D., Cat. Hemip. N. A., p. 492, 1917.
Tibicen auletes Davis, Jl. N. Y. Ent. Soc., xxvi, p. 149, 1918.

A greenish-brown and black or nearly fulvous and black species of very large size. This is the largest of our cicadas, the specimens at hand measuring from 40.5 to 42 mm.

Color: Head black, marked with greenish-brown as follows: A spot along antennal ledges which broadens on towards the eyes, an elongate median spot on upper portion of front, a median and two lateral spots at base of front, and irregular spots beginning laterad of the lateral ocelli and extending along posterior margin to the eyes. Pronotum mostly greenish-brown, with two, black, triangular, median spots tapering posteriorly to the collar and enclosing an elongate light stripe and each, in our specimens, with a fulvous spot in anterior portion. The portion back of the eyes is also black and connects with a black narrow line which runs along the groove in front of the collar. The lateral margins are narrowly black. Mesonotum mostly black, the median arms of the W being fulvous, these fulvous lines broadening and extending laterad and caudad to the cruciform elevation which is greenish-brown. The lateral margins of the mesonotum are also fulvous. Abdominal terga black, the basal segment and the last three segments being pruinose in fresh specimens. The wings have the veins, with the exception of the basally fulvous media, greenish-brown basally, becoming darker apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are distinctly darkened. The basal areoles of the fore wings are greenish-brown. The flaps are grayish to brownish in color. Beneath the insect is olive-green and pruinose in fresh specimens. The legs are of about the same color.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	40.5	to	42
Width of head	18.5	to	19
Expanse of fore wings	116	to	122
Greatest width of fore wing	19	to	19.5
Greatest width of operculum	9.5		
Greatest length of operculum	12		

The opercula are very large and broad, separated at base medially, but overlapping quite strongly for a short distance, the outer margins slightly sinuate, and the apices broadly rounding.

Genitalia: The supra-anal plate of the male has a very broad but short median process which does not equal the rounded lateral angles. The uncus, when viewed laterally, is broad basally, narrowed medially, and then enlarged at the apex which somewhat resembles a horse's hoof. Viewed caudally it is a comparatively short and very broad sclerite with its truncate apex slightly but distinctly emarginate. The last ventral segment of the male is fully twice as wide as long, the margins slightly sinuately tapering to the rounded, almost truncate apex. The pygofers of the female have a broad and short but acutely-pointed median spine which scarcely exceeds the lateral angles. The last ventral segment of the female has the lateral margins practically straight and the broad angular emargination of the posterior margin extends half way to the base. The lateral pieces of the ovipositor each bears three slight ridges followed by about ten fairly distinct, rounded teeth.

Distribution: In the collection of the Kansas State Agricultural college are specimens which were taken in Riley county. Davis records specimens from Labette county also. As far as the writer knows these are the only two records of the occurrence of this insect in the state. Davis states that it is found from eastern Kansas and Nebraska to Michigan and Massachusetts, and southward along the coast to Florida. Van Duzee records it from Massachusetts, New York, New Jersey, Maryland, District of Columbia, North Carolina, South Carolina, Georgia, Florida, Alabama, Louisiana, Mississippi, Michigan, Missouri, and Kansas. It would seem, therefore, that Kansas is its western limit.

Remarks: Concerning the song of this species Davis writes: "Its song is monotonous in tone and not loud, considering the size of the insect. It often commences to sing late in the afternoon and continues off and on until dark."

The specimens examined by the writer were taken in Georgia.

Tibicen dorsata (Say).

(Pl. xx. figs. 5-6: pl. xxiv, fig. 8; pl. xxvi, fig. 4; pl. xxvii, fig. 7.)

Cicada dorsata Say, Jl. Acad. Nat. Sci. Phila., iv, p. 331, 1825: Compl. Writ., ii, p. 252.
Thopha caria Walk., List Homop., i, p. 42, 1850.
Fidicina crassa Walk., Ins. Saund., Homop., p. 10, 1858.
Cicada dorsata Uhl., Bul. U. S. Geol. Geog. Surv., i, p. 342, 1876.
Cicada dorsata Uhl., Trans. Md. Acad. Sci., i, p. 152, 1892.
Cicada dorsata Tuck., Kans. Univ. Sci. Bul., iv, p. 64, 1907.
Cicada dorsata Davis, Jl. N. Y. Ent. Soc., xxiii, pp. 161, 164, 1915.
Tibicen dorsata Van D., Cat. Hemip. N. A., p. 495, 1917.

A large greenish-yellow and black species. Specimens at hand vary in length from 31 to 38 mm.

Color: Head mostly black but with yellowish-green spots running along antennal ledges to eyes, each of which spots usually contains a small black spot, and with irregular light spots along posterior margin laterad of the lateral ocelli. Also on the upper part of the front there is a small elliptical light spot. Pronotum yellowish-green, usually with the two attenuated, black, median triangles which enclose a light median line, and usually widen out making the groove cephalad of the collar black. Often only parts of these triangles are present. Sometimes the part back of the eyes is black as is also a very narrow portion of the lateral margins. The mesonotum has the following parts black: Between the arms of the W, a long posteriorly narrowing line on each side laterad of this, and a pair of narrower lines on the lateral margins, also a large triangular spot cephalad of the light cruciform elevation which sends an anterior process cephalad between the inner arms of the W. The arms of the W apically, the lateral margins and the depressions around the cruciform elevation, are all heavily pruinose. The abdominal terga are black with a row of dorsal white spots. The first segment has lateral white spots, the third segment often with a narrow pruinose line along the anterior margin, and the rest of the segments pruinose laterally, the last segment often being entirely pruinose. The wings have the veins, with the exception of the usually black base of media, yellowish-brown and becoming darker apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are distinctly darkened. The basal areoles of the fore wings are brownish, and the flaps of both wings are grayish, the first ones with an orange tinge. The wings appear strongly vitreous due to the unusual corrugation of the membrane, and are slightly clouded apically. Beneath the insect is testaceous, the opercula lighter, and in fresh specimens is entirely pruinose. The legs are of about the same color as the under side, the posterior ones being darkest. They are distinctly striped.

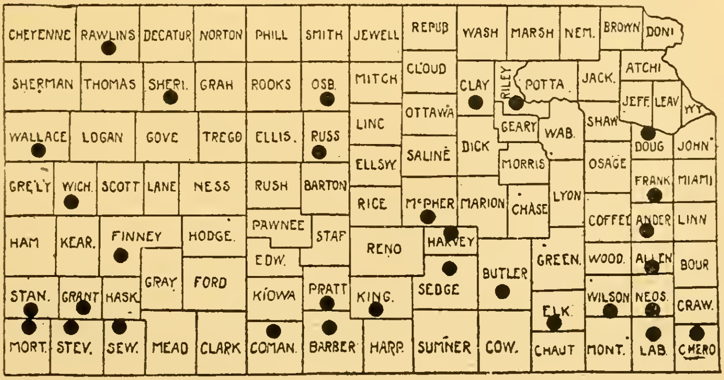
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	31	to	38
Width of head	12.5	to	15
Expanse of fore wings	90	to	105
Greatest width of fore wing	15	to	19
Greatest width of operculum	6.5	to	8.5
Greatest length of operculum	9	to	14

The opercula are distinctly longer than broad, slightly overlapping medially, the lateral margins recurved, and the posterior margins evenly and broadly rounded.

Genitalia: Supra-anal plate of male roundly emarginate posteriorly, without any signs of a median tooth, the lateral angles strongly angulate. Uncus, viewed laterally, is broadest at the base, curving, the apex obtuse. Viewed caudally the general form is triangular, but the apex is quite broad and almost truncate. The ventral piece has two short and stout arms which are not deeply cleft. The last ventral segment of the male is not quite twice as broad as long and is very broadly rounded or nearly truncate posteriorly. The pygofers of the female have a short median spine which does not exceed the well-rounded lateral margins. The last ventral segment of the female has the lateral margins straight, the posterior margin with a rounded emargination reaching half way to the base. The lateral pieces of the ovipositor have well-developed teeth or ridges, about six of the thirteen on each side being prominent.

Distribution: Our records indicate that this species is our most widely distributed form in the state. It has been taken in over thirty counties from all parts of the state. The records from Russell and Riley counties are those of the Kansas State Agricultural College. Those from Clay and McPherson counties are by Davis. Van Duzee records it from the following other states: Missouri, Iowa, Nebraska, Arkansas, New Mexico, Texas and Colorado. The following map shows its distribution in Kansas:


CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS.
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
FRANK
MIAMI
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
COFFEE
ANDER
LINN
HAM
KEAR.
FINNEY
HODGE.
PAWNEE
STAF
RENO
HARVEY
EDW.
GREEN.
WOOD.
ALLEN
BOUR
GRAY
FORD
BUTLER
STAN.
GRANT
HASK
KIOWA
PRATT
KING.
SEDGE
WILSON
NEOS.
CRAW.
ELK
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT.
LAB.
CHERO

Tibicen resh (Hald.).

(Pl. xx, figs. 3-4; pl. xxiv, fig. 7; pl. xxvi, fig. 2; pl. xxvii, fig. 5.)

Cicada resh Hald., Stansb. Salt Lake Exped., p. 369, pl. 9, fig. 17, 1852.
Cicada robertsoni Fh., Trans. N. Y. Agr. Soc., xiv, (1854), p. 745, 1855.
Cicada robertsoni Davis, Jl. N. Y. Ent. Soc., xxiii, p. 164, 1915, (synon. of *resh*).
Cicada resh Davis. Jl. N. Y. Ent. Soc., xxiii, p. 5, pl. 1, fig. 3, 1915.
Tibicen resh Van D., Cat. Hemip N. A., p. 493, 1917.
Tibicen resh Davis, Jl. N. Y. Ent. Soc., xxvi, p. 149, 1918.

A large yellowish-green and black species. Specimens at hand measure from 32 to 35 mm.

Color: Head mostly black, but with large triangular spots along antennal margins to eyes, an oval spot on upper portion of front, triangular spots at base of front, a spot just caudad of this, and irregular spots on each side along posterior margin laterad of the lateral ocelli, yellowish-green. Pronotum yellowish-green, marked with black as follows: Two small triangular spots on anterior margin which sometimes run backward and fuse with the black converging lines in the grooves which run back to the collar, and with two spots laterally in groove cephalad of collar. In dark specimens the entire anterior margin of the pronotum may be black, as well as the entire groove cephalad of the collar. Such forms have the two large black characteristic median triangles which enclose a median elongate greenish spot. Mesonotum largely black, with two elongate lateral greenish to brownish spots on each side and a median pair of spots of the same color which form the Hebrew letter *resh* inverted. The abdominal terga are black as a rule, but often have the posterior margins brownish. The wings have the veins greenish basally, with the possible exception of media, but they become brownish apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are strongly darkened. The basal areole of the fore wings is greenish while the flaps of both wings are a brownish-gray. Beneath the insect is usually testaceous and in fresh specimens is pruinose. The legs are also testaceous, the femora streaked, and the tarsi and tibiæ darker.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	32	to	35
Width of head	14.5	to	16.5
Expanse of fore wings	98	to	107
Greatest width of fore wing	15	to	16
Greatest width of operculum	7	to	7.5
Greatest length of operculum	9	to	9.5

The opercula are about as broad as long excluding the extension beyond the coxal cavity. They overlap very slightly medially, and the posterior margins are broadly and evenly rounded.

Genitalia: The supra-anal plate of the male has a broad and stout but very low median process which does not equal the rather pointed lateral angles. The uncus, viewed laterally, is widest at the base, somewhat curving, and widened again apically, with the apex rather truncate. Viewed caudally it is a broad and short sclerite, the apex quite truncate and shallowly notched. The ventral piece has the slender arms widely and deeply separated and each curves laterad apically. The last ventral segment of the male is nearly twice as wide as long, with the apex broad and truncate and with a very slight median emargination. The pygofers of the female have the usual stout and acute median tooth which far exceeds the distinctly angulate lateral angles. The last ventral segment of the female has the lateral margins distinctly sinuate and the broad angular emargination of the posterior margin reaches fully half way to the base. Each of the lateral pieces of the ovipositor bears about seven very indistinct and rounded teeth. Should this condition prove constant it would be of taxonomic value.

Distribution: While we have a goodly number of specimens of this species, an examination shows that they were all taken in Elk county and this seems to be our only record for the state. Van Duzee gives Mississippi, Louisiana, Oklahoma, Texas and Utah as the states in which it has been taken. Thus it seems to be more common in the South, and may prove to be distinctly southern if, as Davis surmises, the Utah record may not be authentic.

Tibicen marginalis (Walk.).

(Pl. xix, figs. 1-2; pl. xxiv, fig. 9; pl. xxvi, fig. 5; pl. xxvii, fig. 3.)

Cicada marginalis Walk., List Homop., iv, p. 1128, 1852 (n. n. for *marginata* Say).

Cicada marginata Say, Jl. Acad. Nat. Sci. Phila., iv, p. 330, 1825; Compl. Writ., ii, p. 251.

Cicada marginata Uhl., Stand. Nat. Hist., ii, p. 227, 1884.

Cicada marginata Woodw., Psyche, v, p. 68, 1888.

Cicada marginata Uhl., Trans. Md. Acad. Sci., i, p. 150, 1892.

Cicada marginata Macg., Can. Ent., xxxiii, p. 81, 1901.

Cicada marginata Sm. & Grsb., Ent. News, xviii, p. 128, 1907.

Cicada marginata Davis, Jl. N. Y. Ent. Soc., xxiii, p. 4, pl. 2, fig. 1, 1915.

Cicada marginata Davis, Jl. N. Y. Ent. Soc., xxiii, p. 240, pl. 18, figs. 2, 4, 1915.

Tibicen marginalis Van D., Check List Hemip., p. 55, 1916.

Tibicen marginalis Van D., Cat. Hemip. N. A., p. 493, 1917.

Tibicen marginalis Davis, Jl. N. Y. Ent. Soc., xxvi, p. 150, 1918.

A very large greenish and black or greenish-yellow and black species. Specimens at hand measure from 36 to 39 mm. Smith and Grossbeck state that specimens examined by them averaged over 40 mm.

Color: Head mostly black, with a broad greenish-yellow stripe along anterior margin from the front to the eyes, a spot of the same color on upper portion of front and also along posterior margin laterad of the lateral ocelli. Pronotum greenish-yellow with two, small, black, median, triangular spots at anterior margin and sometimes with black spots extending cephalad from collar to meet these, thus enclosing an elongate, light, median dash which frequently contains a black median line. Mesonotum mostly black, the W being greenish-yellow with the angles greatly enlarged and laterad of this is a large, almost fulvous spot on each side. The cruciform elevation is of about the same color as these lateral spots. Abdominal terga black with the posterior margins fulvous or testaceous as are also the tympanal coverings of the male. The wings have the veins greenish basally and brownish apically. The cross veins between R_3 and

R_{4+5} and between the latter and M_1 are not at all, or only slightly, infuscated. The basal areoles of the fore wings are green; the flaps of both wings are greenish-yellow. Beneath, the entire surface is brownish or testaceous and fresh specimens are pruinose, with the exception of the median portion of the abdomen in rubbed specimens. Legs of the same color as the under side, slightly darkening apically, and showing distinct ridges on the femora.

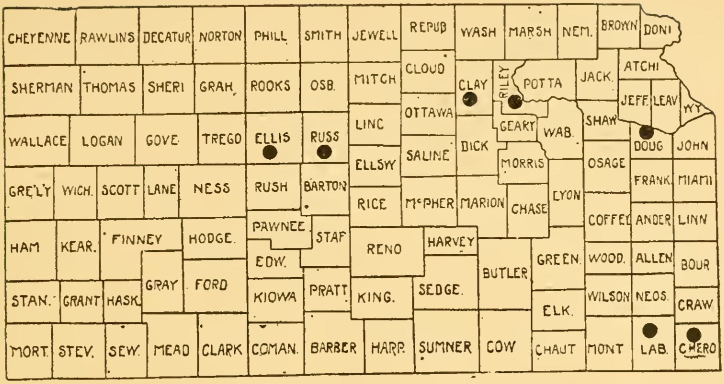
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	36	to	39
Width of head	17	to	17.25
Expanse of fore wings	107	to	112
Greatest width of fore wing	17	to	18
Greatest width of operculum	7.5	to	8
Greatest length of operculum	8.5	to	9

The costal margin of the fore wings is distinctly bent near its middle. The opercula are only slightly longer than broad, overlap slightly for a short distance medially, and the posterior margins are broadly and evenly rounded.

Genitalia: The supra-anal plate of the male is roundingly and deeply concave between the lateral angles, and there are no signs of a median tooth. The uncus, viewed laterally, is stout and curving, and tapers to a rather obtuse apex. Viewed caudally it is triangular, the apex distinctly pointed but obtuse, and with the usual triangular depression on the upper portion of its dorsal aspect. The ventral piece is strongly V-shaped, the arms being quite stout. The last ventral segment of the male is nearly twice as broad as long, the sides slightly sinuate and the apex very broadly rounded or nearly truncate. The pygofers of the female have distinct but rounded lateral angles and a rather long, slender and acute median tooth. The last ventral segment of the female has the margins straight and the posterior margin is broadly and roundingly emarginate almost one-half the distance to the base. Each lateral piece of the ovipositor has about twelve teeth or ridges of which the median six teeth are quite distinct.

Distribution: This species has been taken in six counties in the state as shown by the following map. The localities here given would indicate its distribution at least over the eastern two-thirds of the state. The records from Riley, Russell, and Ellis counties are those of the Kansas State Agricultural College. Van Duzee records its occurrence in Florida, Ohio, Kentucky and Texas, as well as in Kansas. Davis says it is a central United States species.



CHEYENNE
RAWLINS
DECATUR
NORTON
PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
NEM.
BROWN
DONI
SHERMAN
THOMAS
SHERI
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
GEARY
WAB.
SHAW
DOUG
JOHN
ELLSW
SALINE
DICK
MORRIS
OSAGE
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK.
MIAMI
HAM
KEAR.
FINNEY
HODGE.
PAWNEE
STAF
RENO
HARVEY
COFFEY
ANDER
LINN
EDW.
BUTLER
GREEN.
WOOD.
ALLEN
BOUR
STAN.
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE.
ELK.
WILSON
NEOS.
CRAW
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW
CHAUT
MONT
LAB.
CHERO

Tibicen dealbata (Davis).

(Pl. xx, figs. 1-2; pl. xxiv, fig. 10; pl. xxvi, fig. 3; pl. xxvii, fig. 17.)
Cicada marginata var. *dealbata* Davis, Jl. N. Y. Ent. Soc., xxiii, p. 162, 1915.
Tibicen dealbata Van D., Cat. Hemip. N. A., p. 493, 1917.

A large green and black species, some specimens, however, being yellowish-brown and black. Specimens at hand measure from 32 to 37.5 mm., most of them averaging about 35 mm.

Color: Head yellowish-green, with a black transverse band between the eyes which is broadened medially to touch the posterior margin and the base of the front, the latter being black but with a greenish elliptical spot on its upper portion. Pronotum greenish, with two irregular median lines usually running from the anterior margin to the collar and enclosing a broad median stripe. These black lines, however, are often reduced to mere spots at the anterior margin and just cephalad of the collar. Mesonotum greenish or brownish, marked with black as follows: Between the arms of the W, a long posteriorly tapering line on each side laterad of this which attains the posterior margin and is connected to the W by a black line at about its middle, a narrower lateral stripe on each side, and a large spot cephalad of the cruciform elevation which sends a median process cephalad between the median arms of the W. In the specimens at hand the lateral margins, the portion in front of the cruciform elevation, and three short narrow stripes at the tips of the arms of the W are pruinose. The abdominal terga are black with the posterior margins of the segments and frequently the sides of the terminal segments, yellowish or brownish. Usually there is a dorsal median row of pruinose spots and the sides are strongly pruinose. The wings have the veins greenish basally and brownish apically. The cross veins between R_3 and R_{4+5} and between the latter and M_1 are usually slightly darkened. The basal areoles of the fore wings are greenish and the flaps are brownish while the flaps of the hind wings are more grayish. Beneath the body is greenish and in fresh specimens is entirely pruinose. The legs are also greenish but with a tendency to become brown apically.

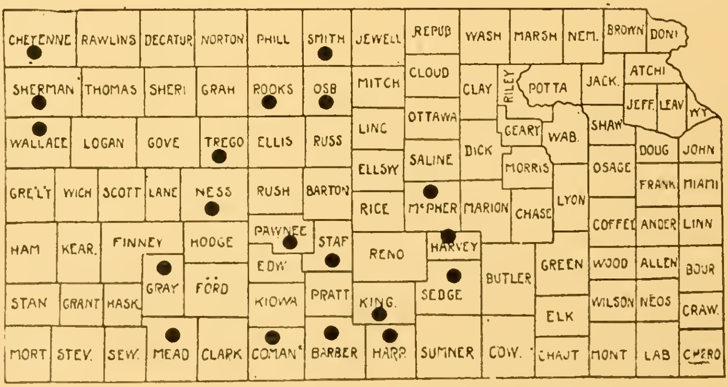
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	32	to	37.5
Width of head	14.5	to	16.5
Expanse of fore wings	97	to	110
Greatest width of fore wing	17	to	18
Greatest width of operculum	6.5	to	7.5
Greatest length of operculum	9.5	to	10

The opercula are distinctly longer than broad if the extension beyond the coxal cavity be included. They overlap slightly for a short distance medially and the posterior margin is broadly rounded, the mesal portion distinctly longer and straighter than the outer part.

Genitalia: The supra-anal plate of the male is roundingly excavated apically and without a median tooth or with the bare suggestion of a very broad one. The uncus, viewed laterally, is regularly curved and narrowed to the obtuse apex. Viewed caudally it is distinctly triangular, the apex being quite pointed. The ventral piece has the arms deeply and rather narrowly divided to receive the apex of the uncus. The last ventral segment of the male is less than twice as wide as long and the apex is distinctly rounded. The pygofers of the female have a large but acute median spine which strongly exceeds the distinct lateral angles. The last ventral segment of the female is comparatively long, with the lateral margins distinctly sinuate and with the angular excavation of the posterior margin reaching slightly over one-third of the distance to the base. Each of the lateral pieces of the ovipositor bears three faint ridges followed by about ten teeth, the third to sixth of which are large and distinct.

Distribution: This species seems to be well distributed over the western two-thirds of the state as shown by the following map. Davis reports it from Colorado also.


CHEYENNE
RAWLINS
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GRE'LY
WICH
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
HAM
KEAR.
FINNEY
HODGE
PAWNEE
STAF
EDW
RENO
HARVEY
BUTLER
GREEN
COFFEE
ANDER
LINN
WOOD
ALLEN
BOUR
STAN
GRANT
HASK
GRAY
FORD
KIOWA
PRATT
KING.
SEDGE
ELK
WILSON
NEOS
CRAW.
MORT
STEV.
SEW.
MEAD
CLARK
COMAN
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT
LAB
CHERO

Remarks: Davis originally described this species as a variety of *T. marginalis*, saying that he considered it as more of a mountainous form than the typical *marginalis*. Its recorded distribution in Kansas would seem to indicate the correctness of his view as to its ecological distribution.

Tibicen eugraphica (Davis).

(Pl. xxi, figs. 7-8; pl. xxv, fig. 2; pl. xxvi, fig. 7; pl. xxvii, fig. 2.)

Cicada eugraphica Davis, Jl. N. Y. Ent. Soc., xxiv, p. 52, pl. 5, fig. 3, 1916.
Tibicen eugraphica Van D., Cat. Hemip. N. A., p. 492, 1917.

A small black species marked with yellowish-orange. The specimens at hand measure from 18 to 24 mm., the average being about 22 mm.

Color: Head black, marked with yellowish-orange as follows: An elliptical spot on upper part of front, a spot on each side above antennæ and running along base of front, a spot on each side above the antennæ and between the latter and the eyes, and irregular spots laterad of lateral ocelli and running along posterior margin. Pronotum yellowish-orange, often with the two black median triangles entire though sometimes broken with orange, the grooves, humeral angles, and anterior margin of collar also irregularly black. Mesonotum yellowish-orange, marked with black as follows: Between the arms of the W, a pair of large spots laterad of these and extending to the posterior margin, small spots on the lateral margins, and caudad of the W a cross-shaped spot which, however, is often reduced to just the standard, on either side of which there are always two black dots. Abdominal terga usually black, sometimes dark brown, the posterior margins yellowish-brown. Fore wings with costal margins light to about the middle, beyond this, along with the rest of the veins, dark brown. Cross veins between R_3 and R_{4+5} and between the latter and M_1 are perfectly clear. The basal areoles of the fore wings are also clear, while the flaps of both wings are grayish. Beneath the insect is brownish, the opercula lighter, and in fresh specimens the whole surface is pruinose. The legs are yellowish-orange and streaked with testaceous.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	18 to 24
Width of head	8 to 9.25
Expanse of fore wings	62 to 69
Greatest width of fore wings	9 to 10
Greatest width of operculum	5
Greatest length of operculum	6

The opercula are distinctly wider than long excluding the extension beyond the coxal cavity. The mesal margins nearly or just touch, the lateral margins are sinuate, while the posterior margins are broadly and evenly rounded.

Gentalia: The supra-anal plate of the male has a broad rectangular notch apically in which is just the suggestion of a median tooth. Viewed laterally the lateral angles have a small but distinct anteriorly projecting tooth. The uncus, viewed laterally, appears stout, with a distinct backwardly-projecting knob at its central portion, and terminates in a stout but acutely-pointed claw which extends cephalo-ventrad. Viewed caudally it is wish-bone shaped, the arms strongly curving and rather well separated apically. The ventral piece has the arms separated by a broadly rounded incision so that they are pressed against the sides of the supra-anal plate. The last ventral segment of the male is about twice as wide as long, the lateral margins slightly sinuate, and the apex nearly truncate. The pygofers of the female have the lateral margins rounding to the acute median tooth. The last ventral segment of the female is a little over twice as wide as long, the angulate emargination of the posterior margin reaching about one-fourth of the distance to the base. The lateral pieces of the ovipositor each bear about nine rounded and quite distinct teeth cephalad of which there is an indistinct ridge.

Distribution: While there are a goodly number of specimens of this species in the Snow collection, an examination reveals that all our Kansas specimens were taken in Barber county. And this seems to be the only record for Kansas. Davis reports this species from Texas, Arizona and New Mexico. Thus it seems to be a distinctively southern form, and possibly reaches its northern limits in Kansas.

Remarks: Two of the specimens at hand are paratypes.

Tibicen vitripennis (Say).

(Pl. xxi, figs. 5-6; pl. xxv, fig. 3; pl. xxvi, fig. 6; pl. xxvii, fig. 4.)

Cicada vitripennis Say, Jl. Acad. Nat. Sci. Phila., ii, p. 236, 1830; Compl. Writ., ii, p. 372.
Cicada albipennis Woodw, Psyche, v, p. 68. 1888.
Cicada vitripennis Uhl., Trans. Md. Acad. Sci., i, p. 153, 1892.
Cicada vitripennis Macg., Can. Ent., xxxiii, p. 83, 1901.
Cicada vitripennis Snow, Kans. Univ. Sci. Bul., ii, p. 349, 1904.
Cicada erratica Osb., Ohio Nat., vi, p. 497, 1906.
Cicada erratica New., U. S. Dept. Agr., Div. Ent., Bul. 60, p. 52, 1906.
Cicada vitripennis Davis, Jl. N. Y. Ent. Soc., xxiv, p. 58, pl. 6, figs. 3-4, 1916.
Tibicen vitripennis Van D., Cat. Hemip. N. A., p. 497, 1917.

A rather small, usually greenish and black species which, however, varies to reddish-brown and black. Specimens at hand measure from 21 to 23 mm.

Color: Head black, with a broad, green band extending from the front along each side, along the antennal ledges to the eyes, and with large, green spots laterad of the lateral ocelli and extending along the posterior margin to the eyes. This leaves the black portion of the head in the form of a cross with a short and broad standard extending from the front to the posterior margin, and long and slender arms reaching to the eyes. Pronotum mostly green, with two black triangular spots on anterior portion which taper posteriorly and then widen just cephalad of the collar into triangular spots, the four enclosing an elongate median green mark. The furrows are also more or less blackened and the lateral angles bear black spots which sometimes extend in a narrow line along the anterior margin of the collar. Mesonotum green, strongly marked with black as follows: Between the arms of the W, large triangular spots laterad of these tapering to posterior margin, and just caudad of the W, a distinct cross with a short and stout standard and with the apices of the arms enlarged. The cruciform elevation is light. Abdominal terga are black, the posterior margins testaceaus, the first segment and sometimes also the second, with a distinct median testaceous line. The wings, as described by Say, are "vitreous immaculate," the cross veins being not at all darkened. The veins of the fore wing, with the exception of media, are green basally and testaceous apically. The basal areoles of the fore wings are entirely clear, while the flaps of both wings are gray. Beneath the body is entirely pruinose in fresh specimens. except for the median black stripe on the abdomen. The opercula are lighter than the rest of the under side. The legs are pale brown, with a distinct tendency to have ridged femora and greenish tibiæ.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body....................	21	to 23
Width of head......................	9	
Expanse of fore wings...............	66	
Greatest width of fore wing..........	9	to 9.5
Greatest width of operculum..........	5.25	to 5.5
Greatest length of operculum.........	6.5	to 6.75

The opercula are broad and short, the inner margins strongly angled, with the points of the angles distinctly separated, and with the posterior margins broadly rounded.

Genitalia: Supra-anal plate of male broadly and deeply excised between the rounded but slightly toothed lateral angles. Uncus, viewed laterally, is stout basally, with a short inner tooth and an outer larger curving and acutely-pointed one. Viewed caudally it is wish-bone shaped, the arms gradually separating to the apices. They are not as widely separated or as curving as in *T. eugraphica.* The ventral piece is strongly U-shaped, the arms rather short and slender and widely separated, fitting against the sides of the supra-anal plate. The last ventral segment of the male is not quite twice as wide as long, the sides sinuately tapering to the well-rounded apex. The margins of the pygofers of the female curve evenly to the base of the well developed and acute median spine. The last ventral segment of the female has the sides roundingly narrowed to the deeply emarginate posterior margin, the emargination reaching nearly half way to the base and having its margins slightly but distinctly emarginate. Each of the lateral pieces of the ovipositor bears about eleven teeth or ridges, of which six are large enough to be very distinctly seen.

Distribution: The only counties in the state from which we have records of this species are Clark, Sumner and Barber.

These being in the extreme southern part of the state, indicate the southern distribution of this species. This is confirmed by the distribution given by Van Duzee, who records it from the following states: Florida, Louisiana, Indiana, Oklahoma, Texas, and Arizona. Davis reports it from Nebraska also.

Remarks: Davis quotes Prof. R. W. Harned as stating that this species is found only on low ground or in swampy places. In his article on Mississippi cicadas he makes *Cicada erratica* a synonym of this species.

Subfamily CICADINÆ Van D.

The members of this subfamily do not have the perfect tympanal coverings possessed by the males of the preceding subfamily, nor are these coverings entirely absent, as in the males of the following subfamily. Our species are medium sized or small forms.

The two genera of this subfamily represented in the state may be separated by the following key:

KEY TO GENERA.

A. Abdomen translucent; cross vein between A_3 and R_{4+5} strongly oblique; tympanal coverings of male large. *Cicada.*

AA. Abdomen not translucent; cross vein between R_3 and R_{4+5} perpendicular or very slightly oblique; tympanal coverings of male very small. *Proarna.*

Genus CICADA Linn.

The members of this genus that occur in the United States are rather small forms. They agree with the genus *Tibicen* in having the tympanal orifices concealed by tympanal coverings, but not perfectly, and yet much better than in the genus *Proarna.* They also have relatively much smaller heads than do the members of the genus *Tibicen.* The abdomen is very characteristic, being distinctly translucent. The opercula are quite small and are widely separated. They differ also from the genus *Proarna* by having the cross vein between R_3 and R_{4+5} strongly oblique instead of perpendicular, as in the latter.

A single member of the genus occurs in the state.

Cicada hieroglyphica Say.

(Pl. xxiii, figs. 1-2; pl. xxv, fig. 6; pl. xxvi, fig. 16; pl. xxvii, fig. 20.)

Cicada hieroglyphica Say, Jl. Acad. Nat. Sci. Phila., vi, p. 235, 1830; Compl. Writ., ii, p. 371.

Cicada characterea Germ., Thon, Ent. Archiv., ii, p. 40, 1830.

Cicada hieroglyphica Harris, Rept. Ins. Mass., p. 176, 1841.

Tettigia hieroglyphica Dist., Biol. Centr. Am., Homop., i, p. 11, pl. 3, fig. 2, 1881.

Tettigia hieroglyphica Uhl., Stand. Nat. Hist., ii, p. 227, 1884.
Tettigia hieroglyphica Macg., Can. Ent., xxxiii, p. 83, 1901.
Cicada hieroglyphica Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 184, 1909.
Cicada hieroglyphica Davis. Jl. N. Y. Ent. Soc., p. 60, pl. 6, fig. 5, 1916.
Cicada hieroglyphica Van D., Cat. Hemip. N. A., p. 496, 1917.
Cicada hieroglyphica Davis, Jl. N. Y. Ent. Soc., xxvi, p. 152, 1918.

A rather small green and black species with the abdomen more yellowish-brown. Specimens at hand measure from 20 to 25 mm.

Color: Head yellowish-green, with two transverse black lines before the eyes and four black longitudinal lines, the outer ones short, running caudad from these. Just mesad and caudad of each eye there are also black spots. Pronotum greenish-yellow, marked with two black median triangular spots, enclosing between them a long light band, and uniting in two smaller triangular spots just cephalad of the collar. The grooves are also black and there are black spots on the humeral angles and small black spots are scattered here and there over the surface. Mesonotum yellowish-green, marked with black as follows: A longitudinal median line, spots between the arms of the W, a small triangular spot on each side at anterior margin laterad of these, and a large spot laterad of these small spots, and a black spot on each side of the median line just cephalad of the light cruciform elevation. The abdominal terga are yellowish-brown, the last segment and supra-anal plate being darker and the second segment has a median dorsal black line. The wings have the veins tawny to brown and all four cross veins are darkened, there also being small brown dots near the tip of each vein. The basal areoles of the fore wings are clear and the flaps of both wings are gray with a tawny tinge. Beneath the insect is a little lighter than above and fresh specimens are quite pruinose. The legs are of about the same color as the under side, striped with testaceous, and darkened apically.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	20	to 25
Width of head	7	to 8
Expanse of fore wings	56	to 60
Greatest width of fore wing	8	to 9
Greatest width of operculum	3.5	
Greatest length of operculum	3	

The opercula are very small, evenly curving from the antero-lateral corner to the point where the two opercula come nearest together, but even at this point they are far apart. In the male the sternites of the abdomen are distinctly keeled.

Genitalia: The supra-anal plate of the male is lightly chitinized dorsally at the apex and bears a small median process. The uncus, viewed laterally, is large, tapering ventrally, and ending in an obtuse apex which bears a small point extending cephalad. In the upper portion of its lateral aspect is a triangular membranous part which seems quite characteristic. Viewed caudally the uncus is narrow at the top, widest just below the middle, and its lower margin has a small median emargination. The last ventral segment of the male is nearly as long as broad, the margins are slightly sinuate and the apex is broadly rounded. The pygofers of the female bear a long median spine and the margins are distinctly and obtusely angulate. The last ventral segment of the female is of about equal length throughout, the posterior margin bearing two small lobes on either side of a small median triangular excavation. The lateral pieces of the ovipositor bear rather weak teeth of which only two or three on each side are prominent, the remaining four or five being very indistinct. Cephalad of the teeth is a very weak ridge on each side.

Distribution: The only record of the capture of this species in Kansas comes from Chautauqua county. Van Duzee records it from the following states: New Jersey, Pennsylvania, North Carolina, Georgia, Florida, Mississippi, Louisiana and Texas. Thus it would seem that Kansas forms the northwestern limit of this species.

Remarks: The males of this species seem to be much more common than the females. Mr. Davis kindly loaned me one of the latter and states that they are comparatively uncommon. He says they occur most commonly in the pine barrens, "where in June and July their songs constitute an almost continuous performance."

Genus PROARNA Stal.

The members of this genus are very small cicadas. The tympanal coverings are very imperfect, leaving most of the tympanal orifice exposed. The abdomen is not translucent and the cross vein of the fore wings between R_3 and R_{4+5} is very characteristically perpendicular instead of oblique. The opercula are small and do not approach each other very closely.

A single member of the genus occurs in Kansas.

Proarna venosa (Uhl.).

(Pl. xxiii, figs. 5-6; pl. xxv, fig. 8; pl. xxvi, fig. 20; pl. xxvii, fig. 8.)

Prunasis venosa Uhl., Ent. Am., iv, p. 82, 1888.
Prunasis venosa Macg., Can. Ent., xxxiii, p. 77, 1901..
Prunasis venosa Dist., Cat. Homop., Cicadidæ, p. 152, 1906.
Proarna venosa Dist., Ann. Mag. Nat. Hist., ser. 8, viii, p. 134, 1911.
Proarna venosa Dist., Genera Ins., fasc. 158, p. 16, 1914.
Proarna venosa Van D., Cat. Hemip. N. A., p. 497, 1917.

A very small pale green to straw-colored species. Specimens at hand measure from 11 to 13 mm.

Color: Head greenish or straw-colored, with a more or less continuous brownish transverse band between the eyes and extending backward medially to enclose the ocelli. The antennal ledges also are usually somewhat brown. Pronotum yellowish-green, immaculate, or with the humeral angles darkened, and sometimes the grooves slightly darkened also. Sometimes there is a suggestion of the two dark median triangles on the anterior margin. Mesonotum yellowish-green, marked with brown as follows: Between the arms of the W, a large posteriorly tapering spot on either side laterad of this, the tips of the anterior arms of the light cruciform elevation, and two faint dots just cephalad of these. Abdominal terga straw-colored, with the bases of the segments, especially laterally, more or less marked with fuscous. The wings have the veins straw-colored or greenish basally, becoming brownish apically. The cross veins between R_3 and R_{4+5}, between R_{4+5} and M_1, and between M_1 and M_2 are sometimes slightly, but usually distinctly darkened, and there is a tendency for all the veins to be slightly smoky apically. The basal areoles of the fore wings are clear and the flaps of both wings are milky-white to straw-colored. Beneath, the insect is straw-colored or yellowish-green, with the opercula lighter. The legs are straw-colored with the femora distinctly banded with fuscous.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	11	to 13
Width of head	3.75	to 4
Expanse of fore wings	29	to 32
Greatest width of fore wing	4	to 5
Greatest width of operculum	2	to 2.5
Greatest length of operculum	2.5	to 3

The opercula are distinctly wider than long excluding the extension beyond the coxal cavity. They are widely separated medially and are broadly rounded from the cephalo-lateral angle to the angulate meso-caudal angle which slightly overlaps the metasternum.

Genitalia: Supra-anal plate of male with a very wide emargination posteriorly. Viewed laterally there is a very strong and acute dorsal point. The uncus, viewed laterally, enlarges apically and is bifid. Viewed caudally it is narrowest basally, widest just below the middle, and ends in four rounded lobes. The ventral piece consists of two very widely separated arms which lie against the supra-anal plate. The last ventral segment of the male is about twice as broad as long and the truncate posterior margin is very slightly emarginate medially. The pygofers of the female have a small median tooth which does not exceed the sinuated posterior margins. The last ventral segment of the female is about three times as wide as long, the posterior margin being broadly emarginated about one-third of the distance to the base, the sides of the emargination themselves being slightly notched. The lateral pieces of the ovipositor each bear two or three indistinct ridges which are followed by four prominent teeth and these by three smaller and indistinct ones.

Distribution: The only counties from which this species seems to have been taken are Sumner and Barber. Van Duzee records it from Texas and New Mexico. Accordingly Kansas seems to be the northern limit of its range.

Subfamily TIBICININÆ (Dist.).

The members of this subfamily differ from those of the preceding in that the males do not have any tympanal coverings at all. In the main they are small to medium sized forms.

There are four genera of the *Tibicininæ* represented in our Kansas fauna. These may be separated by the following key:

KEY TO GENERA

A. Cells of median area of fore wings distinctly longer than marginal cells.
  B. Head about as broad as base of mesonotum. Opercula nearly touching medially. *Tibicina.*
  BB. Head distinctly narrower than base of mesonotum. Opercula widely separated.
    C. Median transverse suture of elytra not very evident. *Okanagana.*
    CC. Median transverse suture of elytra very evident. *Tibicinoides.*
AA. Cells of median area of fore wings not distinctly longer than marginal cells. *Melampsalta*

Genus TIBICINA Kol.

The tympanal coverings are entirely absent in this genus, in this respect agreeing with the following three genera. It differs from them, however, in having a relatively broader head which is as broad as the base of the mesonotum. Added to this is the characteristic of the opercula which nearly touch medially. As in the two following genera the cells of the median area of the fore wings are distinctly longer than the marginal cells.

The single member of the genus and its variety occur in the state. Only the 17-year race has been definitely recorded from within our borders though the 13-year race comes so close in Missouri that it would be surprising if it did not extend westward over into the state.

Tibicina septendecim (Linn.).

(Pl. xxiii, figs. 9-10; pl. xxv, fig. 5; pl. xxvi, fig. 14; pl. xxvii, fig. 19.)

Cicada septendecim Linn., Syst. Nat., edn. 10, i, p. 436, 1758; edn. 12, ii, p. 708, 1767.
Tettigania septendecim Fabr., Syst. Ent., p. 679, 1775.
Tettigonia costalis Fabr., Ent. Syst., Suppl., p. 516, 1798.
Cicada septendecim Germ., Thon, Ent. Archiv., ii, p. 4, 1830.
Cicada septendecim Harris, Rept. Ins. Mass., p. 167, 1841.
Cicada septendecim Harris, Treat. Ins. Inj. Veg., edn. 2, p. 180, 1852.
Cicada septendecim Jag., Life of N. Am. Ins., p. 64, 1859.
Tibicen septendecim Stal, Ann. Soc. Ent. Fr., ser. 4, i, p. 618, 1861.
Cicada septendecim Harris, Treat. Ins. Inj. Veg., edn. 3, p. 206, 1862.
Cicada septendecim Ril., 1st Mo. Rept., p. 18, 1868.

Tibicen costalis Stal, Hemip. Fabr., ii, p. 116, 1869.
Tibicen septendecim Stal, Hemip. Fabr., ii, p. 116, 1869.
Cicada septendecim Uhl., Stand. Nat. Hist., ii, p. 227, 1884.
Cicada septendecim Lintn., 2nd Rept. N. Y. St. Ent., p. 167, 1885.
Cicada septendecim Ril., Rept. U. S. Dept. Agr. for 1885, p. 233.
Tibicen septendecim Uhl., Trans. Md. Acad. Sci., i, p. 160, 1892.
Cicada septendecim Marl., U. S. Dept. Agr., Div. Ent., Bul. n. s. 14, 1898.
Tibicen septendecim Felt, N. Y. St. Mus. Memoir, 8, i, p. 231. pl. 46, fig. 2, 1905.
Tibicina septendecim Dist., Cat. Homop., Cicadidæ, p. 125, 1906.
Cicada septendecim Marl., U. S. Dept. Agr., Div. Ent., Bul. 71, 1907.
Tibicina septendecim Van D., Cat. Hemip. N. A., p. 500, 1917.
Tibicina septendecim Davis, Jl. N. Y. Ent. Soc., xxvi, p. 152, 1918.

A medium sized black and orange species. Specimens at hand measure from 28 to 30 mm.

Color: Head entirely black except sometimes for a small orange median triangle at the posterior margin. The eyes are either black or orange in the dead specimens. Pronotum black except laterally, the inflexed portions being of an orange tinge. Sometimes the collar is faintly tinged with the same color. Mesonotum black except for narrow lateral orange stripes. Abdominal terga black, the conjunctivæ often appearing orange as does the posterior portion of the last segment in the male. The wings have the costal margin and the veins distinctly orange basally, but apically they become brown. The whole wing, especially basally and apically is more or less smoky. The W at the cross veins is quite prominent. The basal areoles of the fore wings are a very dark brown. The flaps are grayish, tinged with orange. Beneath, the insect is mostly black but with at least the posterior margins of the abdominal segments nearly orange and with the light color extending up the sides. Often the abdominal sternites are entirely brown. The legs are an orange-brown, striped with testaceous, the tarsi darker.

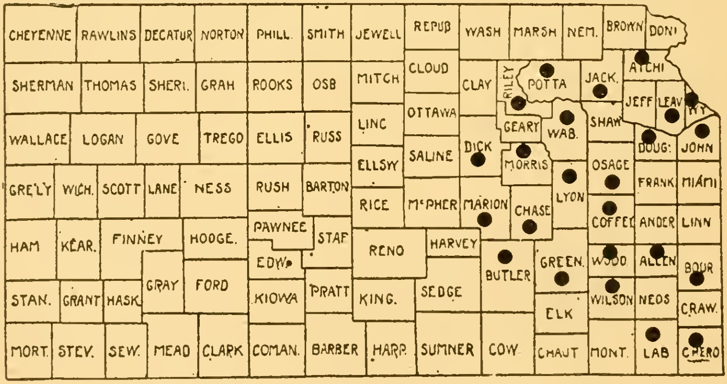
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	28	to 30
Width of head	8.75	to 9.25
Expanse of fore wings	80	to 88
Greatest width of fore wings.........	12.5	to 13.5
Greatest width of operculum	3	
Greatest length of operculum	4.5	

The opercula are quite narrow, having the outer and posterior margins forming a semicircle, and their postero-mesal margins well separated.

Genitalia: The supra-anal plate of the male has a very large median projection. Viewed caudally its margins are inflexed below this median tooth, and each bears near its middle two curving, mesally projecting, finger-like processes and near the base a larger and more strongly haired one. The uncus, viewed laterally, has the form of a triangle with its apex bent strongly cephalad. Viewed caudally it has the form of two sclerites extending downward from the anal tube, encircling the penis, and widening below it into two triangular processes which taper to acute apices. The penis is usually strongly protruded from between the two parts of the uncus and possesses terminally two very characteristic little sclerites which meet dorsally and are wide apart ventrally and whose rounded margins are strongly serrate. The last ventral segment of the male is about twice as wide as long, the lateral margins sinuate to the rounded posterior margin. The pygofers of the female have the margins evenly rounding to the prominent median spine. The last ventral segment of the female has a very large incision posteriorly which reaches over one-half the distance to the base. The ovipositor is provided with about thirteen quite even and similar teeth on each side.

Distribution: According to Marlatt, only Broods I and IV are known to occur in Kansas. The former brood is recorded by him (Bul. 71, U. S. Dept. Agr., Div. Ent., 1907) from Leavenworth and Dickinson counties. Brood IV is our big brood and is recorded from the counties marked on the following map. In addition to Marlatt's record, specimens have been taken from Atchison, Butler and Riley counties and these, with the records of Brood I, are included in the map. None of these broods go further west than Kansas, and it is very likely that other broods of the 17-year race and some broods of the 13-year race occur in the state, but there seem to be no records of them.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BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK
MIAMI
PAWNEE
HAM
KEAR.
FINNEY
HOOGE.
STAF
COFFEE
ANDER
LINN
EDW
RENO
HARVEY
GREEN.
WOOD
ALLEN
BOUR
GRAY
FORD
STAN.
GRANT
HASK
KIOWA
PRATT
KING.
SEDGE
BUTLER
WILSON
NEOS
CRAW.
ELK
MORT.
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW
CHAUT
MONT.
LAB
CHERO

Remarks: Marlatt gives the three different notes characteristic of the song of this species as follows:

1. At the height of the season, when many males are singing together, the most characteristic note is represented by the letters tsh-e-e-E-E-E-e-ou. Thus it was described by Fitch.
2. Early in the season when few males have emerged the Pha-r-r-r-aoh note is heard.

3. The clicking note "consisting of from 15 to 30 short, quick sounds, sometimes double, the whole lasting about five seconds."

Tibicina septendecim var. *cassinii* (Fish.).

Cicada cassinii Fish., Proc. Acad. Nat. Sci. Phila., v, p. 272, 1851.
Cicada septendecim var. *cassinii* Ril., 1st Mo. Rept., p. 21, 1868.
Cicada septendecim var. *cassinii* Van D., Cat. Hemip. N. A., p. 501, 1917.

This variety occurs along with typical *septendecim.* It differs from the latter in being distinctly smaller and in usually having the under side of the abdomen entirely black. Riley states that the genital hooks of the male (uncus) vary considerably in this variety whereas they are constant in typical *septendecim.* At any rate they are often just like those of the latter.

Genus OKANAGANA Dist.

This is a very large genus the members of which are most abundant in the western states. As in *Tibicina* the cells of the median area of the fore wings are distinctly longer than the marginal cells. The head is clearly narrower than the base of the mesonotum. The opercula are widely separated. The transverse suture of the fore wings is not as distinct as in the following genus.

Only two species belonging to this genus are known to occur in Kansas. They may be separated by the following key:

KEY TO SPECIES.

A. Species smaller, less than 20 mm.; black and honey-yellow in color. *synodica.*

AA. Species larger, over 20 mm.; black marked with reddish or orange. *bella.*

Okanagana synodica (Say).

(Pl. xxii, figs. 5-6; pl. xxv, fig. 11; pl. xxvi, fig. 19; pl. xxvii. fig. 15.)

Cicada synodica Say, Jl. Acad. Nat. Sci. Phila., iv, p. 334, 1825; Compl. Writ., ii, p. 253.
Cicada synodica Uhl., Bul. U. S. Geol. Geog. Surv., i, p. 341, 1876; iii, p. 455, 1877.
Tibicen synodica Woodw., Psyche, v, p. 68, 1888.
Tibicen synodica Macg., Can. Ent., xxxiii, p. 78, 1901.
Okanagana synodica Dist., Cat. Homop., Cicadidæ, p. 126, 1906.
Okanagana synodica Van D., Jl. N. Y. Ent. Soc., xxiii. pp. 27, 40, 1915.
Okanagana synodica Van D., Cat. Hemip. N. A., p. 503, 1917.

A small black and honey-yellow species. Specimens at hand measure from 15 to 18.5 mm.

Color: Head mostly black, with a transverse line across antennal ledges and base of front, three triangular spots on posterior margin and median line on front, honey-yellow. Pronotum with entire margin honey-yellow except for black spots on humeral angles. On either side of the pale median line are two large usually quadrate black spots, the grooves on either side of these are broadly black and parallel to the lateral margins, and extending on parallel to the adjacent portions of the posterior margins, are right-angled black marks on either side. The mesonotum is honey-yellow marked with black as follows: Between the arms of the W, a line extending back from these to the pale cruciform elevation with a dot on either side, and laterally two large triangular posteriorly tapering spots which reach the posterior margin. Abdominal terga black with the posterior margins honey-yellow, the terminal segments almost wholly light. The wings have the veins almost entirely honey-yellow but slightly darkening apically, and usually distinctly infuscated. The basal areoles of the fore wings are opaque and dark brown or brownish-yellow. The flaps are grayish tinged with yellowish or orange. Beneath the insect is almost wholly honey-yellow. The legs are of the same color but strongly marked with dark brown, the tarsi being dark.

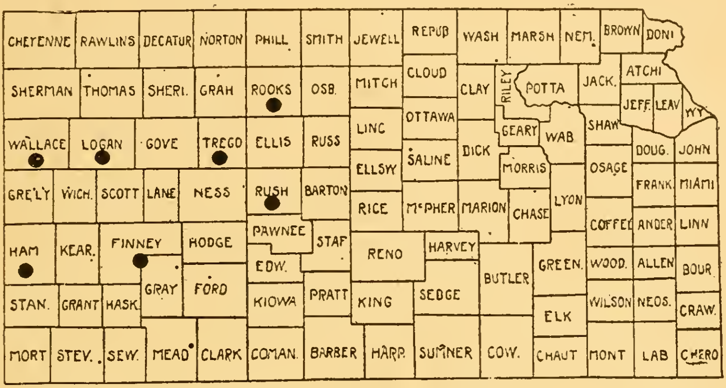
Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	15	to 18.5
Width of head	4.5	to 5.25
Expanse of fore wings	38	to 44
Greatest width of fore wing	5.75	to 6
Greatest width of operculum	1.25	to 2
Greatest length of operculum	2.5	to 2.75

The opercula are very small and narrow, strongly curved on both sides and ending in an obtusely pointed apex which points mesad and ends in about a line with the exterior margin of the coxa.

Genitalia: The supra-anal plate of the male is slightly but broadly emarginate on the posterior margin. The uncus, viewed laterally, is narrow basally, then widens to widest point and then tapers to rather obtuse apex. Viewed caudally it is broadly elliptical and slightly emarginate ventrally. The ventral piece has very stout arms which are deeply divided and whose apices suddenly narrow and turn slightly mesad. The last ventral segment of the male is distinctly less than twice as wide as long, the lateral margins are distinctly sinuate and the apex is truncate. The pygofers of the female have the posterior margins distinctly sinuate to the very small but distinct median tooth. The last ventral segment of the female has the lateral margins slightly sinuate and the posterior margin is broadly and deeply emarginate nearly three-fourths of the distance to the base. The ovipositor is stout and the lateral pieces are each supplied with about thirteen very regular ridges and teeth.

Distribution: This species occurs in the western part of the state as shown by the following map. The records from Wallace, Logan and Rooks counties are those of the Kansas State Agricultural College. Van Duzee records it from Colorado and New Mexico. Accordingly Kansas would seem to be the eastern limit of its range.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PHILL
SMITH
JEWELL
REPUB
WASH
MARSH
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BROWN
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SHERMAN
THOMAS
SHERI.
GRAH
ROOKS
OSB.
MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
OTTAWA
LINC
GEARY
WAB
SHAW
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
SALINE
DICK
MORRIS
OSAGE
DOUG.
JOHN
ELLSW
GRE'LY
WICH.
SCOTT
LANE
NESS
RUSH
BARTON
RICE
McPHER
MARION
CHASE
LYON
FRANK.
MIAMI
COFFEE
ANDER
LINN
FINNEY
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PAWNEE
STAF
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ELK
WILSON
NEOS.
CRAW.
MORT
STEV.
SEW.
MEAD
CLARK
COMAN.
BARBER
HARP.
SUMNER
COW.
CHAUT
MONT
LAB
CHERO

Okanagana bella Davis.

(Pl. xxii, figs. 3-4; pl. xxv, fig. 10; pl. xxvi, fig. 17; pl. xxvii, fig. 21.)

Okanagana bella Davis, Jl. N. Y. Ent. Soc., xxvii, p. 198, pl. 20, fig. 1, 1919.

A medium-sized black species, marked with reddish or orange. Specimens at hand measure from 21.5 to 22 mm.

Color: Head black, with antennal ledges, dash back of median ocellus, sometimes two spots at base of front and median line on upper portion of front, reddish-orange. Pronotum black, sometimes margined all around with orange, but always along the posterior margin. Mesonotum black, anterior arms of dark cruciform elevation spotted with orange and in front of them are two orange spots. The metanotum is black, the posterior margin being orange. Abdominal terga black, posterior margins narrowly orange dorsally, the orange band wider laterally. The wings have the costal margin orange to the end of the radial cell, the remainder of the veins being brown. The basal areole of the fore wing is dark brown, the flaps of both wings and parts of the bases of each wing being strongly orange. Beneath the insect is orange and black, the abdominal sternites with the posterior margins orange, the orange replacing the black more and more on the posterior segments. The legs are orange but strongly marked and striped with black.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	21.5 to 22
Width of head	7 to 7.25
Expanse of fore wings	60 to 65
Greatest width of fore wing	10 to 11
Greatest width of operculum	3
Greatest length of operculum	4
Length of valve	5

The opercula are very small, widest basally, then suddenly narrowed due to a sudden incurving of the lateral margin. Then they slightly widen again before the lateral margin meets the mesal margin in an obtuse point which points mesad. The valve is quite elongate and acutely pointed apically.

Genitalia: The supra-anal plate of the male is very slightly emarginate apically. The uncus, viewed laterally, is narrow basally, then widened, the margins subparallel till near the very slightly hooked apex. Viewed caudally it is emarginate apically and the emargination appears slightly notched on each side. The ventral piece has the arms very widely separated and each is slightly notched apically. The last ventral segment of the male is nearly as long as wide, the lateral margins distinctly sinuate and the posterior margin truncate. The pygofers of the female have the posterior margins slightly sinuate on either side of the stout median terminal projection. The last ventral segment of the female has the lateral margins strongly narrowed and the posterior margin is angularly emarginate fully one-half the distance to the base. The ovipositor is stout, the lateral pieces each bearing about a dozen broad teeth.

Distribution: The only record of the occurrence of this species in Kansas is that given by Davis who states that there is a pair of specimens of this species from this state in the collection of the Academy of Natural Sciences, Philadelphia. Presumably it occurs in the western part of the state. The specimens examined are from Colorado, Arizona, Utah and Oregon. In addition Davis names the following states where this species is known to occur: New Mexico, Wyoming, Montana, Idaho, California and Washington, and it also occurs in Alberta and British Columbia.

Remarks: As Davis mentions, members of this species have in the past been confused with *Okanagana rimosa* (Say).

Genus TIBICINOIDES Dist.

The members of this genus are very like those belonging to the genus *Okanagana*. The chief difference lies in the very evident median transverse suture of the fore wings which is much less distinct in the members of the latter genus.

A single member of the genus occurs in Kansas.

Tibicinoides hesperius (Uhl.).

(Pl. xxiii, figs. 3-4; pl. xxv, fig. 9; pl. xxvi, fig. 18; pl. xxvii, fig. 14.)

Cicada hesperia Uhl., Bul. U. S. Geol. Geog. Surv., i, p. 342, 1876.
Tibicen hesperia Uhl., Trans. Md. Acad. Sci., i, p. 161, 1892.
Tibicina? hesperia Dist., Cat. Homop., Cicadidæ, p. 125, 1906.
Tibicinoides hesperius Van D.. Jl. N. Y. Ent. Soc., xxiii, pp. 27, 43, 1915.
Tibicinoides hesperius Van D., Cat. Hemip. N. A., p. 504, 1917.
Okanagana hesperia Davis, Jl. N. Y. Ent. Soc., xxvii, p. 218, 1919.

A rather small honey-yellow and black species with the wings clouded basally and strongly marked with reddish or orange. The specimens at hand measure from 19 to 21 mm.

Color: Head black, marked with yellowish as follows: The antennal ledges, a large median elliptical spot on upper portion of front, often three spots at base of front, and a median line caudad of median ocellus. Pronotum black, bordered entirely with a narrow yellow collar, with yellowish markings in grooves and on lateral parts. Mesonotum black, marked with yellowish as follows: Tips of outer arms of W and its bases, the extreme lateral margins, and cephalad of the black-spotted anterior arms of the light cruciform elevation. The metanotum is mostly yellowish. Abdominal terga mostly yellowish, the first two segments darker and with median and lateral darker lines on all the segments. Sometimes the abdomen is entirely black with only the posterior margins yellowish. The wings have the costal margin yellowish up to the tip of the radial cell, otherwise the veins are brownish to black. Usually the veins are heavily infuscated up to the marginal cells, giving the basal portion a brownish color. The basal areoles of the fore wings are heavily clouded with brown. The flaps of both wings are reddish or orange as are other parts of the base of the hind wings. Beneath, the insect is honey-yellow, strongly marked with black, the abdomen being lighter than the other parts. The legs are so heavily marked with black as to appear nearly entirely dark.

Form: The following are the measurements in millimeters of the specimens at hand:

Length of body	19	to	21
Width of head	6.5	to	7.5
Expanse of fore wings................	51	to	53
Greatest width of fore wing	7.5	to	9
Greatest width of operculum..........	3		
Greatest length of operculum..........	2.5		

The opercula are broader than long, widest at the base, then suddenly narrowed by the excavation of the lateral margin, the obtuse apex pointing mesad. The nodal furrow of the fore wings is very marked, forming a distinct transverse V with its arms widely separated.

Genitalia: The supra-anal plate of the male is very slightly but distinctly emarginate posteriorly. The uncus, viewed laterally, is widest near the base, the apex having a distinct downward hook due to a ventral preapical rounded incision. Viewed caudally it narrows apically and shows the lower margin to be distinctly emarginate. The ventral piece has its arms separated by a wide rounded incision and their apices are turned distinctly mesad. The last ventral segment of the male is considerably less than twice as wide as long, the lateral margins are strongly sinuate, and the broad truncate apex is broadly and clearly incised. The pygofers of the female have the margins regularly curving to the small but stout median tooth. The last ventral segment of the female is quite characteristic, the lateral margins being sinuate while the posterior margin is deeply and angularly excavated over one-half the distance to the base, the margins of the excavation being distinctly notched. The ovipositor is short and stout, the teeth on the lateral pieces being quite rounded and even, about a dozen on each side.

Distribution: This species has been taken in the three western counties of Trego, Ellis and Russell. The latter two records are those of the Kansas State Agricultural College. Van Duzee records it from Colorado, Nevada, and California. Davis mentions New Mexico, Arizona and Montana as states where it occurs. It is very evidently a western species which reaches its eastern limits in Kansas.

Remarks: There seems to be some doubt as to the proper generic disposition of this species. Davis places it in the genus *Okanagana* because the relative size of the marginal cells and those of the median area of the fore wing is about the same as in the members of that genus. On the other hand the coloring of the fore wings is that of the genus *Tibicinoides* as is also the very conspicuous nodal furrow.

Genus MELAMPSALTA Kol.

These are very small cicadas. The tympanal coverings are lacking, and the venation of the fore wings is very characteristic in that the marginal cells are of about the same size or even longer than the cells of the median area.

The single member of the genus occurs in Kansas.

Melampsalta calliope (Walk.).

(Pl. xxiii, figs. 7-8; pl. xxv, fig. 7; pl. xxvi, fig. 21; pl. xxvii, fig. 6.)

Cicada calliope Walk., List Homop., i, p. 212, 1850.

Cicada parvula Say, Jl. Acad. Nat. Sci. Phila., iv, p. 233, 1825; Compl. Writ., ii, p. 253.

Cicada pallescens Germ., Thon, Ent. Archiv., ii, p. 8, 1830.

Carineta parvula Uhl., Ent. Am., iv, p. 22, 1888.

Cicada parvula Uhl., Trans. Md. Acad. Sci., i, p. 165, 1892.

Cicada parvula Macg., Can. Ent., xxxiii, p. 76, 1901.

Cicada calliope Kirk., Can. Ent., xli, p. 390, 1909.

Melampsalta parvula Van D., Bul. Buf. Soc. Nat. Sci., ix, p. 184, 1909.

Melampsalta calliope Van D., Cat. Hemip. N. A., p. 506, 1917.

Melampsalta calliope Davis, Jl. N. Y. Ent. Soc., xxvi, p. 154, 1918.

A very small yellowish-brown to greenish species. Specimens at hand measure from 12.25 to 15.5 mm.

Color: Head in brown forms either practically unmarked or with an irregular broad transverse black band with a distinct dash projecting cephalad on each side of the base of the front which itself is basally dark except for the light median portion. Pronotum of brown forms either unmarked or the grooves irregularly marked with black. The mesonotum of the brown forms has two short median and two large lateral black lines. The abdominal terga of the brown forms may be unmarked or darkened basally and laterally. The wings of the brown forms have brownish veins, the basal areoles of the fore wings are clear and the flaps of both wings are grayish with a brownish tinge. Beneath, the body is nearly uniformly brown, the legs being marked with darker lines. The green forms at hand are uniformly green except for a transverse black band on the head cephalad of the eyes, black spots below the antennæ, and the rostrum and tips of tarsi blackish.

Form: The following are the measurements in millimeters of the specimens at hand:

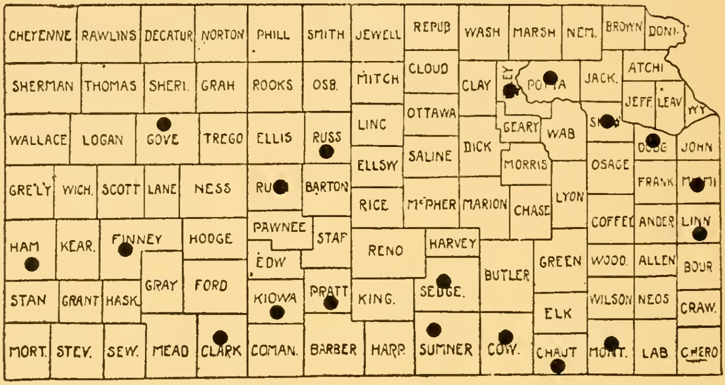
Length of body	12.25	to	15.5
Width of head	3.5	to	4.5
Expanse of fore wings	33	to	40
Greatest width of fore wing	5.5	to	7
Greatest width of operculum	3		
Greatest length of operculum	3.25		

The cells of the median area of the forewing are of about the same size or shorter than the marginal cells. This is most constant in regard to the relative length of cells 1st R_5 and 2nd R_5.

The opercula are quite small, about as broad as long, widely separated medially, and broadly rounding laterally and posteriorly.

Genitalia: The supra-anal plate of the male when viewed laterally is seen to be strongly pointed dorsally and to have a distinct caudally-projecting dorsal lobe on the posterior margin, just below which is a smaller rounded lobe. The uncus, viewed laterally, appears like a short, acute, curved process. Viewed caudally it consists of two diverging processes which taper to subacute apices. The last ventral segment of the male is triangular, about one-third wider than long, the lateral margins sinuately tapering to the obtuse apex. The pygofers of the female have the margins sinuate to the base of the large median spine. The last ventral segment of the female is very short and the posterior margin is broadly and triangularly emarginate nearly to the base. The ovipositor is equipped with about ten distinct and well rounded teeth on each side.

Distribution: This is a quite common species in the state. The records show it to be well distributed over Kansas as shown by the following map. The records from Riley and Russell counties are those of the Kansas State Agricultural College. Van Duzee records it from the following other states: New Jersey, North Carolina, Georgia, Florida, Tennessee, Louisiana, Arkansas, Illinois, Nebraska, Iowa, Colorado and Texas. Davis reports it from Mississippi also.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MITCH
CLOUD
CLAY
RILEY
POTTA
JACK.
ATCHI
JEFF.
LEAV
WY
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSS
LINC
OTTAWA
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GEARY
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SALINE
MORRIS
OSAGE
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WICH.
SCOTT
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COW.
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MONT.
LAB
CHERO

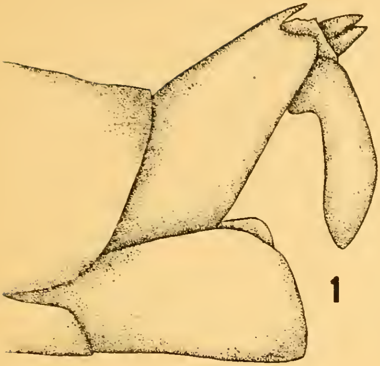
Explanation of Plates.

PLATE XVIII.

MALE GENITALIA—

1. Lateral view of *Tibicen linnei.*
2. Caudal view of *Tibicen linnei.*
3. Lateral view of *Tibicen pruinosa.*
4. Caudal view of *Tibicen pruinosa.*
5. Lateral view of *Tibicen lyricen.*
6. Caudal view of *Tibicen lyricen.*

PLATE XVIII.



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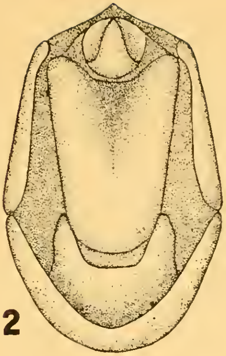

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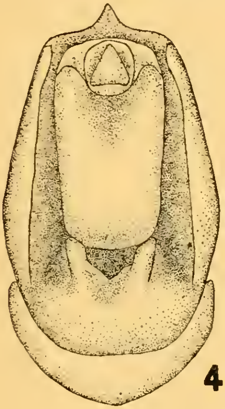

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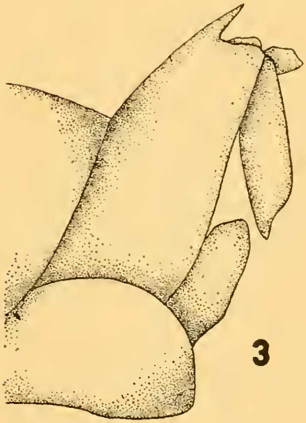

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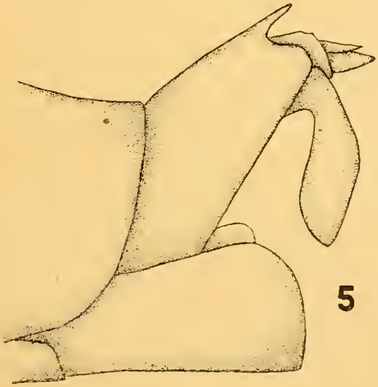

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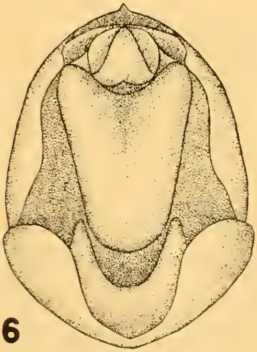

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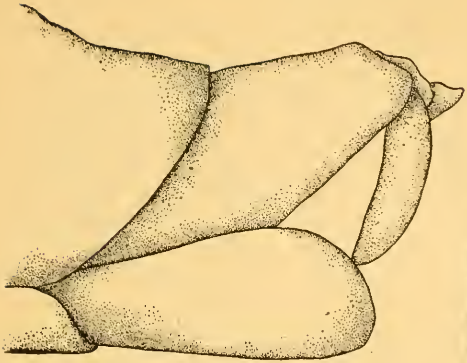
PLATE XIX.

Male Genitalia—

1. Lateral view of *Tibicen marginalis.*
2. Caudal view of *Tibicen marginalis.*
3. Caudal view of *Tibicen resonans.*
4. Lateral view of *Tibicen resonans.*
5. Caudal view of *Tibicen auletes.*
6. Lateral view of *Tibicen auletes.*

PLATE XIX.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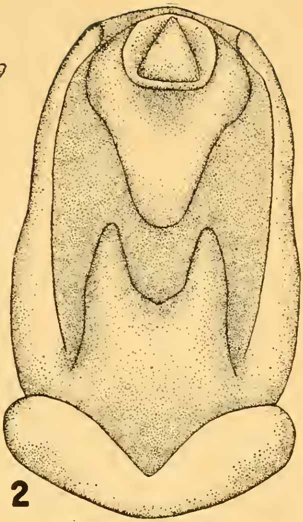
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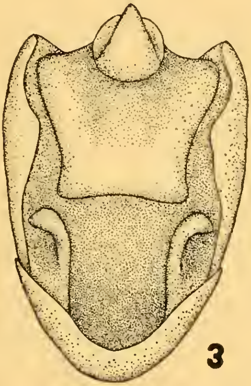
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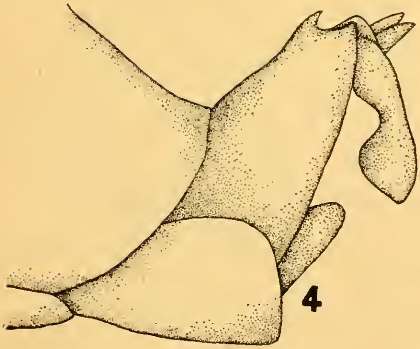
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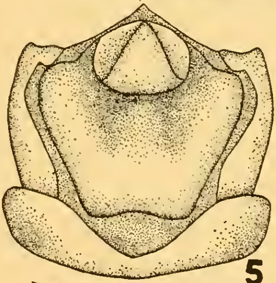
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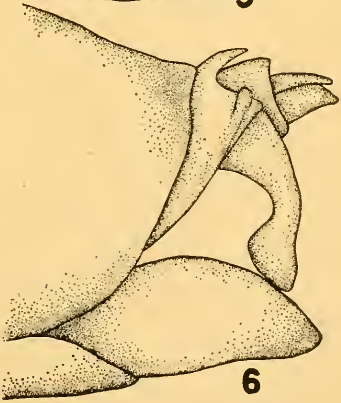
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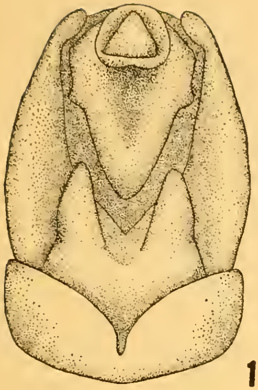
PLATE XX.

MALE GENITALIA—

1. Caudal view of *Tibicen dealbata.*
2. Lateral view of *Tibicen dealbata.*
3. Caudal view of *Tibicen resh.*
4. Lateral view of *Tibicen resh.*
5. Caudal view of *Tibicen dorsata.*
6. Lateral view of *Tibicen dorsata.*

PLATE XX.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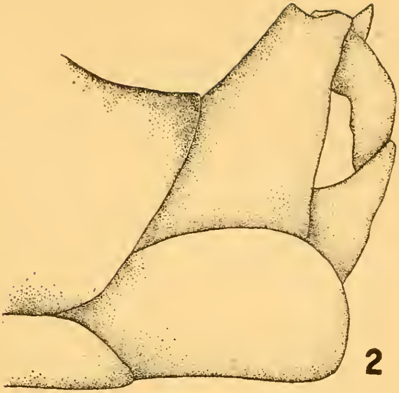
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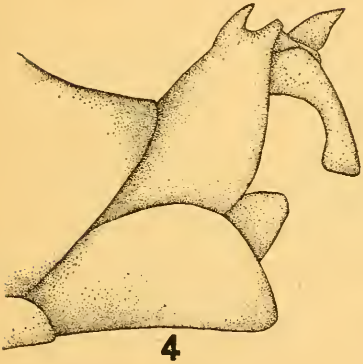
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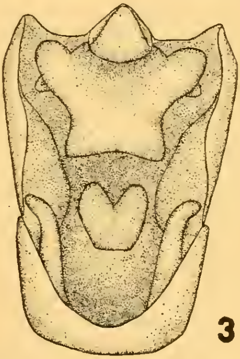
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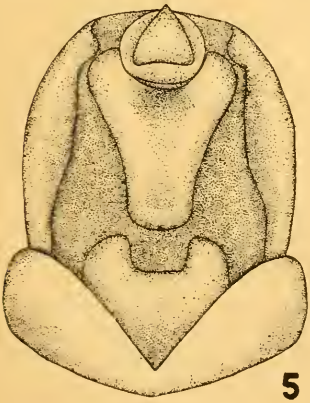
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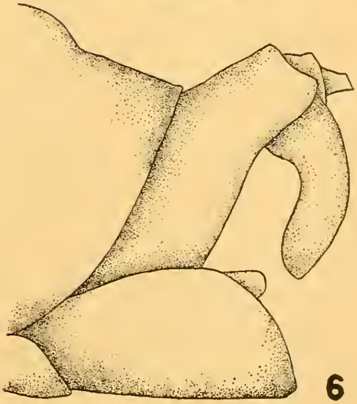
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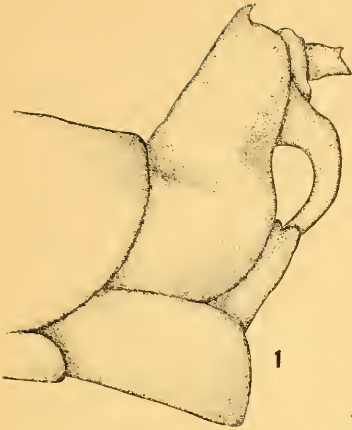
PLATE XXI.

MALE GENITALIA—

1. Lateral view of *Tibicen bifidus.*
2. Caudal view of *Tibicen bifidus.*
3. Lateral view of *Tibicen superba.*
4. Caudal view of *Tibicen superba.*
5. Caudal view of *Tibicen vitripennis.*
6. Lateral view of *Tibicen vitripennis.*
7. Caudal view of *Tibicen eugraphica.*
8. Lateral view of *Tibicen eugraphica.*

PLATE XXI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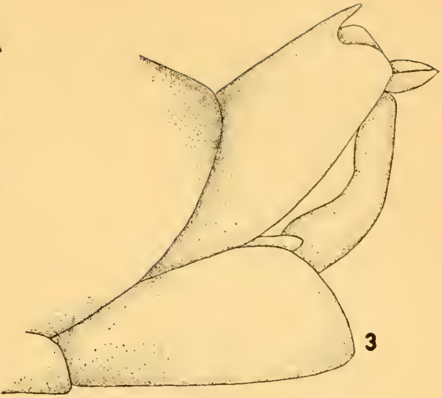
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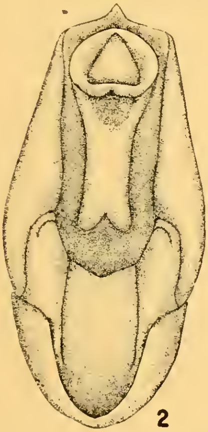
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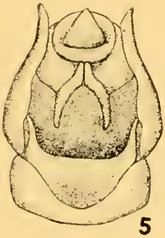
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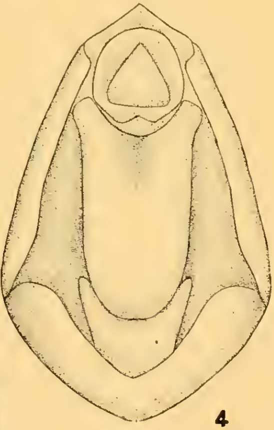
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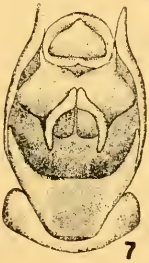
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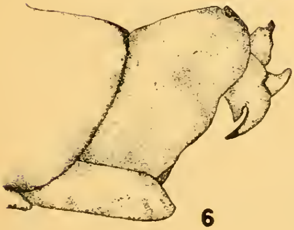
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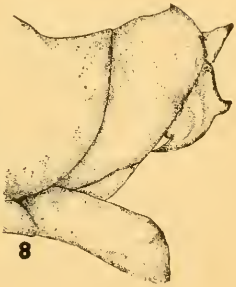
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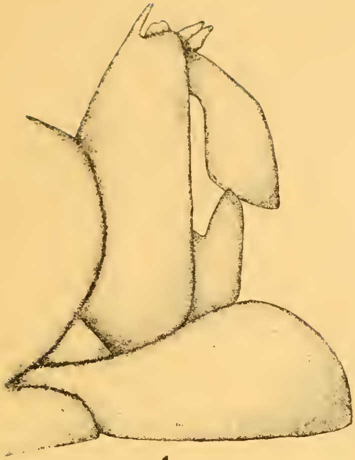
PLATE XXII.

Male Genitalia—

1. Lateral view of *Tibicen aurifera.*
2. Caudal view of *Tibicen aurifera.*
3. Caudal view of *Okanagana bella.*
4. Lateral view of *Okanagana bella.*
5. Lateral view of *Okanagana synodica.*
6. Caudal view of *Okanagana synodica*

PLATE XXII.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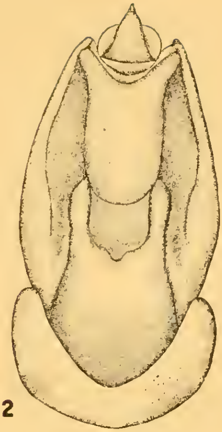
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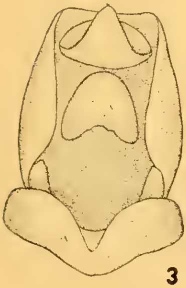
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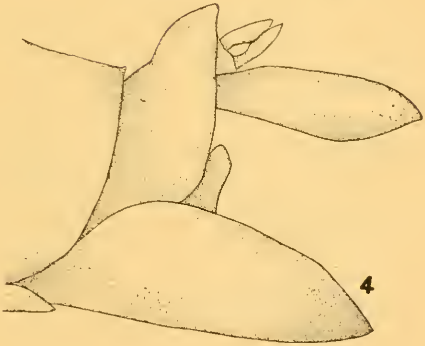
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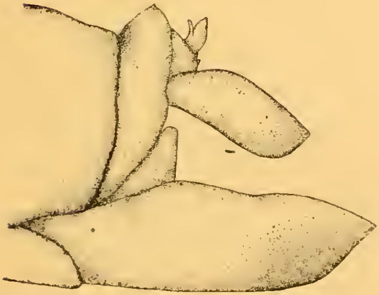
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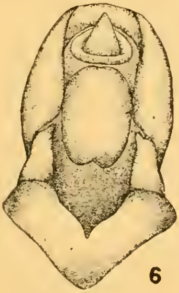
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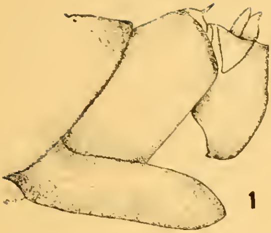
PLATE XXIII.

MALE GENITALIA—

1. Lateral view of *Cicada hieroglyphica.*
2. Caudal view of *Cicada hieroglyphica.*
3. Lateral view of *Tibicinoides hesperius.*
4. Caudal view of *Tibicinoides hesperius.*
5. Caudal view of *Proarna venosa.*
6. Lateral view of *Proarna venosa.*
7. Caudal view of *Melampsalta calliope.*
8. Lateral view of *Melampsalta calliope.*
9. Caudal view of *Tibicina septendecim* var. *cassinii.*
10. Lateral view of *Tibicina septendecim* var. *cassinii.*

PLATE XXIII.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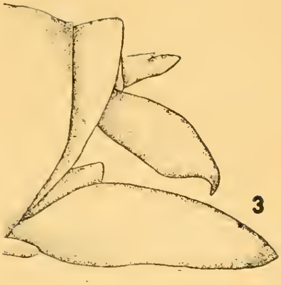
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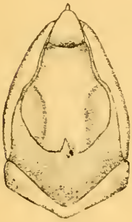
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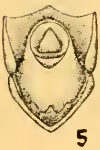
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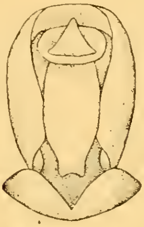
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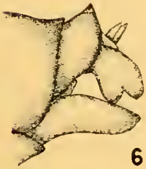
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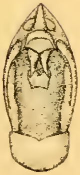
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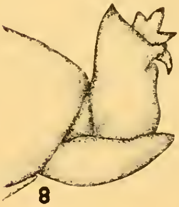
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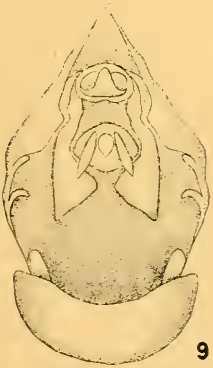
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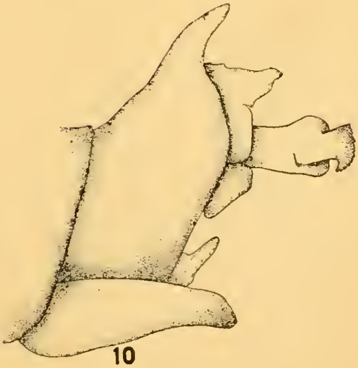
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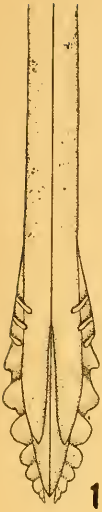
PLATE XXIV.

OVIPOSITORS—

1. *Tibicen lyricen.*
2. *Tibicen linnei.*
3. *Tibicen pruinosa.*
4. *Tibicen superba.*
5. *Tibicen aurifera.*
6. *Tibicen resonans.*
7. *Tibicen resh.*
8. *Tibicen dorsata.*
9. *Tibicen marginalis.*
10. *Tibicen dealbata.*

PLATE XXIV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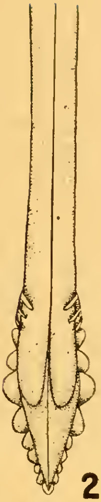
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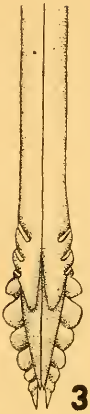
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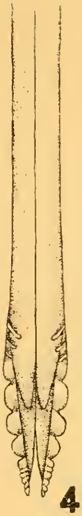
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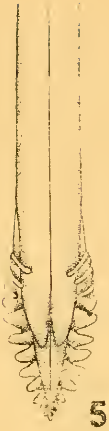
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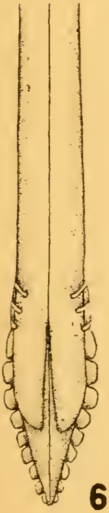
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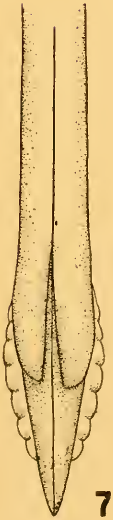
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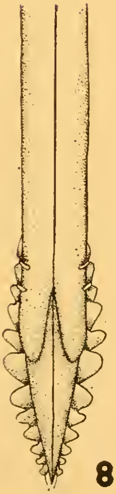
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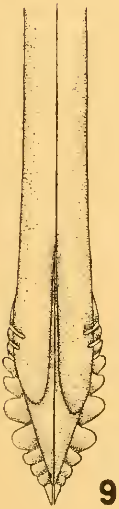
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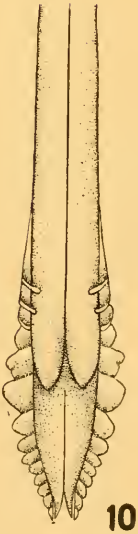
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PLATE XXV.

OVIPOSITORS—

1. *Tibicen auletes.*
2. *Tibicen eugraphica.*
3. *Tibicen vitripennis.*
4. *Tibicen bifidus.*
5. *Tibicina septendecim.*
6. *Cicada hieroglyphica.*
7. *Melampsalta calliope.*
8. *Proarna venosa.*
9. *Tibicinoides hesperius.*
10. *Okanagana bella.*
11. *Okanagana synodica.*

PLATE XXV.

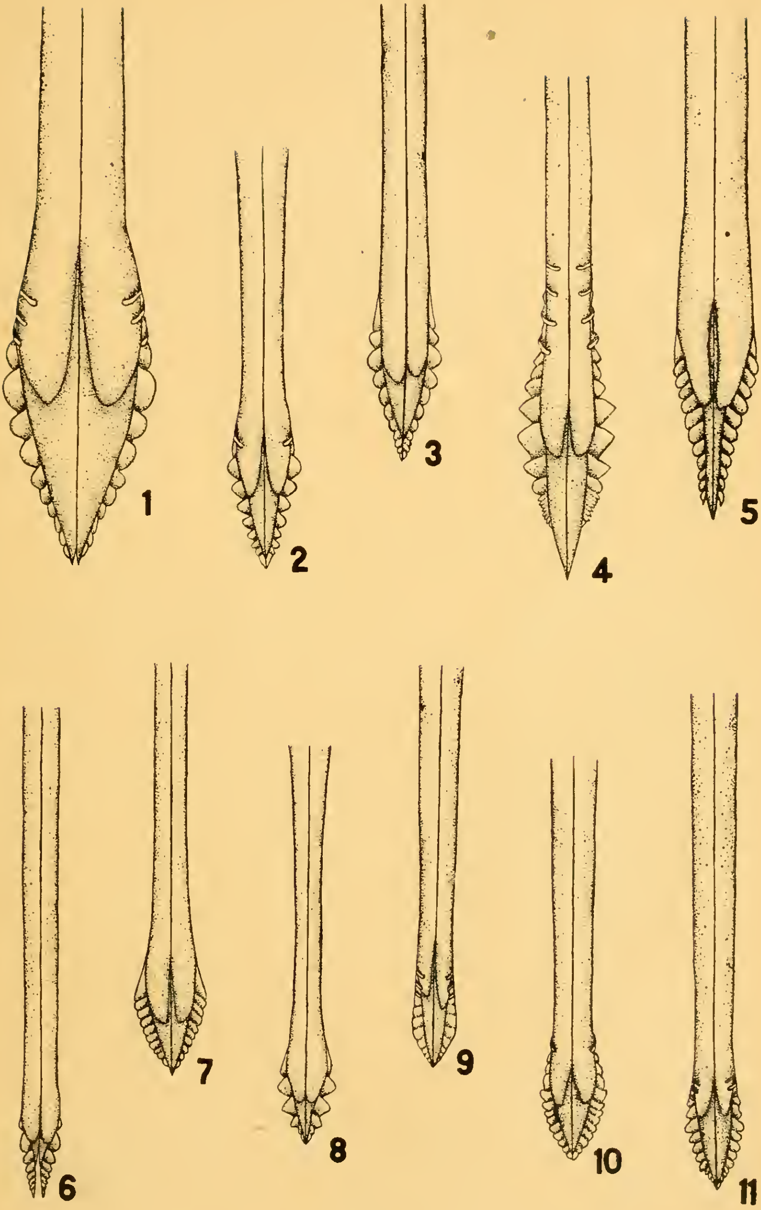
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PLATE XXVI.

LAST VENTRAL SEGMENT OF THE MALE—

1. *Tibicen auletes.*
2. *Tibicen resh.*
3. *Tibicen dealbata.*
4. *Tibicen dorsata.*
5. *Tibicen marginalis*
6. *Tibicen vitripennis*
7. *Tibicen eugraphica.*
8. *Tibicen lyricen.*
9. *Tibicen bifidus.*
10. *Tibicen pruinosa.*
11. *Tibicen linnei.*
12. *Tibicen superba*
13. *Tibicen resonans.*
14. *Tibicina septendecim.*
15. *Tibicen aurifera.*
16. *Cicada hieroglyphica.*
17. *Okanagana bella.*
18. *Tibicinoides hesperius.*
19. *Okanagana synodica*
20. *Proarna venosa.*
21. *Melampsalta calliope.*

PLATE XXVI.

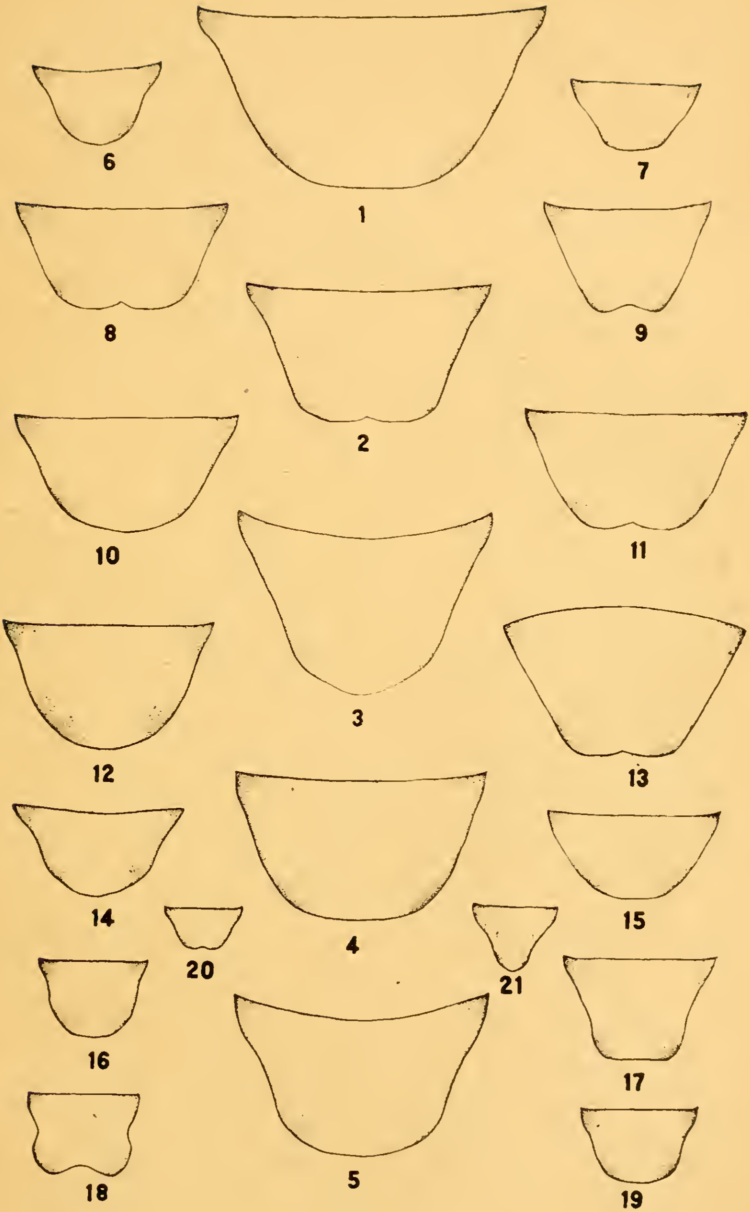
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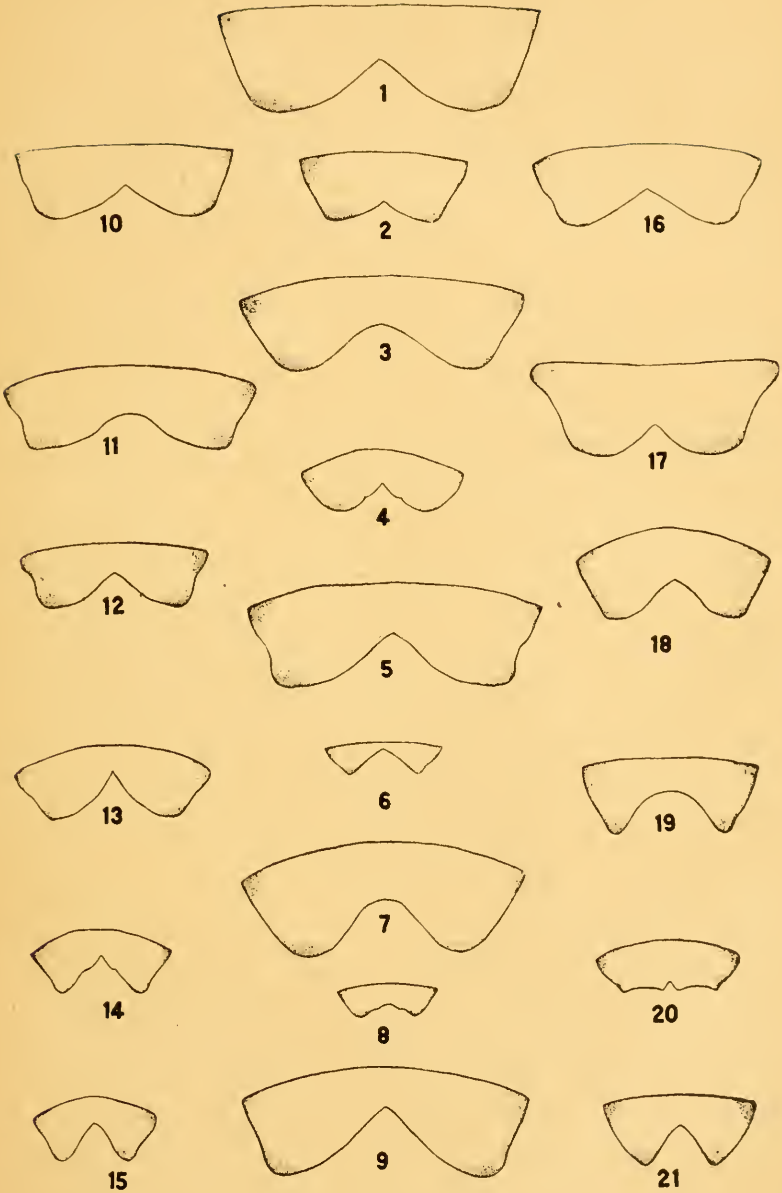
PLATE XXVII.

LAST VENTRAL SEGMENT OF THE FEMALE--

1. *Tibicen auletes*
2. *Tibicen eugraphica.*
3. *Tibicen marginalis.*
4. *Tibicen vitripennis*
5. *Tibicen resh.*
6. *Melampsalta calliope.*
7. *Tibicen dorsata.*
8. *Proarna venosa.*
9. *Tibicen resonans.*
10. *Tibicen pruinosa.*
11. *Tibicen lyricen*
12. *Tibicen aurifera.*
13. *Tibicen bifidus.*
14. *Tibicinoides hesperius.*
15. *Okanagana synodica.*
16. *Tibicen linnei*
17. *Tibicen dealbata.*
18. *Tibicen superba*
19. *Tibicina septendecim.*
20. *Cicada hieroglyphica.*
21. *Okanagana bella.*

PLATE XXVII.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